

# The Role of Porto University in the Development of Entrepreneurial Ecosystem

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**Abstract:** This paper aims to share best practices of the Porto University (U. Porto) entrepreneurial ecosystem. Co-creation demands great dynamics and universities are the favourite partners in new technological grounds where uncertainty is a characteristic and knowledge a differentiation. Entrepreneurial ecosystem refers to the environment that affects the local/regional entrepreneurship and U. Porto, in Portugal, offers an example of excellency in the catalysts for technological innovation and financial attraction resources. As an extensive set of internal and external components, the U. Porto has gathered the potential to function as a sustainable infrastructure to support the creation of competitive technologies and start-ups. The present study shares insights into the types of agents, institutions, cultures and resources that an entrepreneurial ecosystem contains. In addition, it highlights governance, openness and decentralization of activities that has played a role in supporting student's founders and their high-growth endeavours.

**Key words:** co-creation; entrepreneurship; entrepreneurial ecosystem; start-ups; U. Porto

**JEL code:** I23

## 1. Introduction

Entrepreneurial Ecosystem (EE) can triggers economic growth (Mason & Brown, 2014; Isenberg & Onyemah, 2016) and its stakeholders can potentially better interact and connect (Zoderer, 2019). Innovation capability is one of the most critical factor that drives business and because it is a complex and multi-factorial challenge, it is highly dependent on the environment (Sivam, Dieguez, Ferreira, & Silva, 2019). In fact, a positive combination of EE components and interactions allows individual entrepreneurs to move efficiently and effectively through their individual entrepreneurial processes (Kuckertz, 2019). Components and the way they interact can create an environment helpful of the “identification and commercialization of entrepreneurial opportunities” (Audretsch & Belitski, 2017, p. 1031). Human Capital, education, training and funding supports, coaching and mentoring, policies, regulations, cultural supports and leadership are inside the entrepreneurial ecosystem (Feld, 2012; Isenberg, 2010; WEF, 2013). Academies through education help to develop entrepreneurial intentions among the community (Honig, 2004) and community helps academy to identify problems/opportunities that requires solutions (Brady et al., 2018). This study aims to explain and share best practices of Porto University (U. Porto), Portugal. Using primary data and interviews with responsible from the

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city of Porto, the results could be practical guidelines for potential implementation elsewhere.

## **2. Literature Review**

### **2.1 Entrepreneurial Ecosystems on Universities**

Higher Education institutions (HEIs) play a well-established role as key agents in creating and promoting regional economic growth and competitiveness (Lehmann, 2015; Pinheiro, Langa, & Pausits, 2015). They are seen as key actors in contributing to economic growth and encouraging entrepreneurial behaviours and innovative activities (Guerrero, Cunningham, & Urbano, 2015). They are at the centre of knowledge creation and exploitation, they are directly funded to implement a mix of innovation and entrepreneurship policy interventions, or, more often, indirectly supported through partnerships with industry (Lehmann, Meoli, Paleari, & Stockinger, 2020). In this sense, an entrepreneurial ecosystem is then characterized by the participation of entrepreneurial firms as an important output of economic systems and an important mechanism to explain the outcome of economic systems (Acs, Estrin, Mickiewicz, & Szerb, 2018). It is a structure that fosters entrepreneurship, like investors, sources of knowledge spillovers, suppliers or consumers and governance, to coordinate and motivate entrepreneurial activities by setting rules and norms (Colombo, Dagnino, Lehman, & Salmador, 2019). Within such an entrepreneurial ecosystem, HEIs play a key role as anchor organizations because they not only contribute to the continuing advance of science, technology, know-how and skills, but also by understanding a leadership role visible through the creation of entrepreneurial thinking universities fulfilling their economic and social potential (Hayter, 2016; Civera, Meoli, & Vismara, 2019).

Universities must be vibrant ecosystems of entrepreneurship (De Jaeger, Mithembu, Ngowi, & Chipunza, 2017), characterized by the breadth and depth of offering initiatives in three major dimensions: academic entrepreneurship, company support and entrepreneur behavior (Peppler, 2013).

## **3. Case Study: U. Porto**

### **3.1 Methodology**

This research is a case study, carried during 2019. It used semi structured interviews to allow more freedom to interviewers to answer in accordance with their own experiences concerning academic degree and knowledge about the present topic (Marconi & Lakatos, 2017). The collected data included secondary data from scientific publications and materials from the city of Porto. The primary data were directly collected on UP, through its internal and external stakeholders linked to entrepreneurial education, namely management, professors, instructors, students, specialists or entrepreneurs. The interviews (ten) were conducted between May and October 2019.

The starting point of this investigation was: “Does UP really positively impact the Entrepreneurial ecosystem in Porto region?”. In addition to the research question, it was essential to outline general and specific objectives. The present study has as main objective to share knowledge about the social and economic value of U. Porto. It starts by presenting a brief history since its foundation on the XVIII century until now as well as communicate its positioning and strategy for the medium and long term. With the general objectives it intends to identify U. Porto:

- Structure, Human Resources skills and educational quality standards;
- Close connection with national and international scientific research, local businesses, cultural and arts institutions, as well as museums, and the two central city hospitals.

- With the specific objectives it is additionally intended to identify U. Porto:
- Focus on areas that will reap more social benefits and economic externalities;
- Strategic initiatives to promote culture innovation, particularly through the structure of UPIN;
- Dynamics business incubators on UPTEC;
- Focus on maintaining leadership in the field of valuing knowledge in Portugal and strengthening its positioning and prestige within the international scenario;
- Internal development.

### 3.2 Data Collection

#### 3.2.1 Framework

The University of Porto (U. Porto) was founded on the XVIII century, being the biggest institution of teaching and researching in Portugal. It is located on Porto, the second town on Portugal, in 3 different Poles (Town center, Asprela and Campo Alegre), gathering 31.000 students, 2.300 professor and researchers. It gathers 14 Faculties, 1 Business School, 1 Entrepreneurial Center, 69 Research Units and Competitions and Business Plans. Its main areas of acting are: Architecture, Arts, Law, Health Sciences, Management, Engineering, Education and Business, among other (U. Porto, 2019). The University's Human Resources also include highly qualified administrative and technical officers, who are responsible for maintaining the institution fully operational and, to a fair extent, successful. The quality of U. Porto's teaching is strengthened by a close connection to scientific research, local businesses, cultural and arts institutions, as well as museums, and the two central city hospitals. Figure 1 represents the Social and Economic Value of U. Porto.

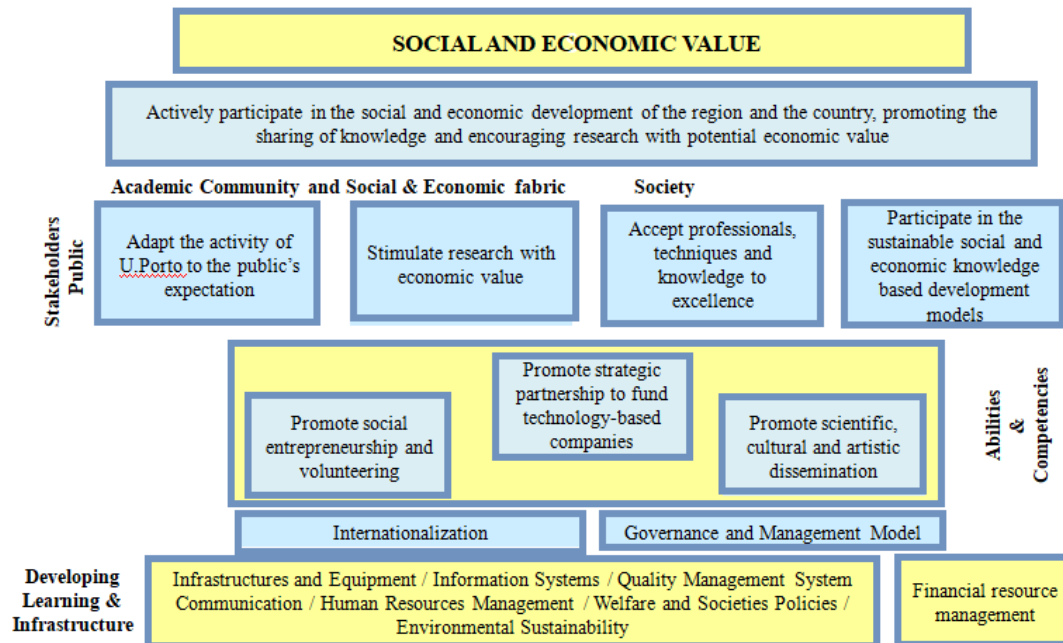


Figure 1 Social and Economic Value of U. Porto (U. Porto, 2011)

The increase in quality, of both the R&D+i activities, by promoting the integration of findings in the social and economic fabric, and training activities, by promoting qualification and employability, inevitably leads to creating value in society. The U. Porto intends to continue to actively participate in the sustainable development of nations, satisfying the most demanding expectations of its public, primarily investing in the development of integrated partnerships with institutions that share the same strategic vision: the development of added value

activities with strong international orientation and visibility. The University will continue to focus on stimulating economically valuable research, emphasising the areas that will reap more social benefits and economic externalities, bearing in mind their relevance for the University's target audiences. The U. Porto will therefore develop the ability to: i) promote strategic partnerships to fund technology-based or socially differentiating companies, ii) promote social entrepreneurship and volunteering work and iii) promote scientific, cultural and artistic dissemination, by stimulating a culturally and technologically wealthy society. By mastering these abilities, the U. Porto will be ready to contribute to a knowledge-based ecosystem and the stronger the University the greater its ability is to strengthen the ecosystem (U. Porto, 2011).

U. Porto also identifies as strategic the maintenance or strengthening of initiatives to promote culture innovation, particularly through the structure of U. Porto Inovação (UPIN), created in 2004, with the purpose of supporting the University's innovation value chain by fostering the transfer of knowledge and reinforcing the bond between the University and businesses. With over 15 years of experience, U. Porto Innovation focuses its activities on research at the University, entrepreneurship within the academic community and U. Porto's growing connections with industry.

Nowadays U. Porto is a major producer of science in the country, responsible for over 23% of the Portuguese scientific articles indexed in the ISI Web of Science. Its secret lies in the daily work of some of Portugal's most productive and renowned research and development (R&D) centres, spanning the various fields of knowledge from the humanities to science and technology. Also the University of Porto is a birthplace of innovation in itself as illustrated by the Science and Technology Park of the University of Porto (UPTEC). It is a facility which today accommodates over 200 companies and 30 technology-driven innovation centres in a variety of knowledge areas. Nerve centre of the University's strategy for capitalising on knowledge, UPTEC fosters business incubation and lends its support to entrepreneurship. U. Porto develops the valorization of knowledge by managing a value chain composed of four phases, namely: i) the initial transfer of knowledge, ii) training for skills in the management area, iii) promotion of new businesses and iv) a structure for incubating these businesses. In other words, UPIN is linked to ideas already incipient (upstream of the innovation process) and focused on intellectual property rights. UPTEC is at the end of the value chain, receiving projects already with concrete requirements. There are no boundaries that limit each of the entities, as they are responsible for boosting the entrepreneurial ecosystem within the university seen as dynamic and alive.

With a focus on maintaining leadership in the field of valuing knowledge in Portugal and strengthening its position and prestige on the international scenario, the U. Porto created, in 2018, a new consultative body, the Innovation Advisory Board made up of professionals with extensive experience in the fields of innovation and entrepreneurship, alongside a strong knowledge of university and business realities. The U. Porto patents' portfolio already has more than 180 active patents in it, being divided in 5 main areas, namely: i) Healthy, ii) Energy and Environment, iii) Biotechnology, Food Technology and Agriculture, iv) ITC, Electronics & Communication and v) Transport, Safety and Industrial Processes.

### 3.2.2 Internal Environment

The internal environment of U.Porto that makes up the innovation entrepreneurial ecosystem are presented on Figure 2, which is basically divided into eight large blocks as follows: (A) Physical Infrastructures, (B) UPIN, (C) Masters, Research and Technology Centres and Laboratories, Companies that have emerged from the entrepreneurial and innovative ecosystem, Business development spaces and Student's Associations, (D) Technologies Portfolio, (E) Porto Business School, (F) Competition and Business Plan, (G) Entrepreneurial

Centre of U.Porto and (H) UPTEC.

Block (A) is characterized by some of the most advanced and prestigious Portuguese research and development (R&D) units in the most knowledge domains, from Life and Health Sciences to Science Agrarian, from Engineering to Fine Arts and Humanities. The units feature a modern research infrastructure geared to the highest standards of quality with variable dimensions, purposes and organizational structures. At R&D units are integrated into organic units or interface institutes in which, in addition to the university, several public and private entities (industries, government agencies, etc.), which further enhance the connection to the community of activities R&D+I. There are still organisms that are inserted in Associated Laboratories, research units oriented towards the pursuit of scientific policy and technological change of the Portuguese Government.

The 26 Research and Development Centres are the following:

Associated Laboratory of Energy, Transport and Aeronautics (LAETA)

- Biodiversity and Evolutionary Biology Research Network (InBIO)
- Center for Biotechnology and Fine Chemistry (CBQF)
- Center for Environmental and Sea Studies (CESAM)
- Center for Social Studies (CES)
- Dom Luís Institute (IDL)
- ICVS/3Bs - Associated Laboratory (ICVS/3Bs)
- INESC Technology and Science (INESC TEC)
- Institute of Biotechnology and Bioengineering (IBB)
- Institute of Chemical and Biological Technology (ITQB)
- Institute of Molecular and Cellular Biology (IBMC.INEB)
- Institute of Molecular Medicine (IMM)
- Institute of Nanostructures, Nanomodeling and Nanofabrication (I3N)
- Institute of Pathology and Molecular Immunology, University of Porto (IPATIMUP)
- Institute of Plasmas and Nuclear Fusion (IPFN)
- Institute of Social Sciences (ICS)
- Institute of Systems and Computer Engineering: I&D Lisboa (INESC - Lisboa)
- Laboratory of Instrumentation and Experimental Particle Physics (LIP)
- Laboratory of Robotics and Systems in Engineering and Science (LARSyS)
- Marine and Environmental Research Center (CIMAR)
- Nanotechnology Institute (IN)
- REQUIMTE - Chemistry and Technology Network - Association (REQUIMTE)
- Research Center on Ceramic and Composite Materials (CICECO)
- Separation and Reaction Processes Laboratory (LSRE)

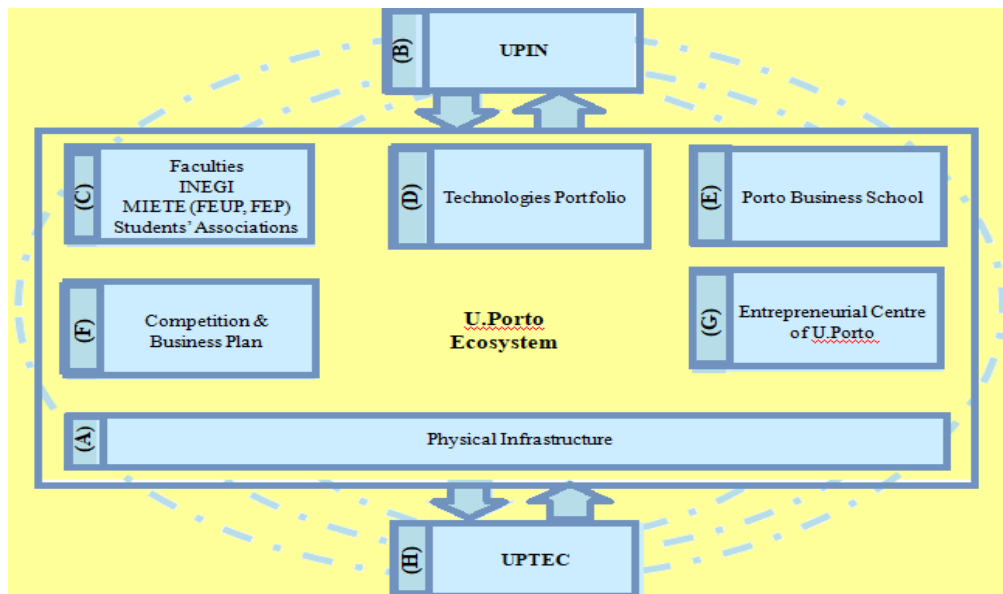


Figure 2 The Internal Environment of U. Porto

Block (B) has the purpose of supporting the University's innovation value chain by fostering the transfer of knowledge and reinforcing the bond between the University and businesses. With over 15 years of experience, UPIN Innovation focuses its activities on research at the University, entrepreneurship within the academic community and U. Porto's growing connections with industry. UPIN is formed by three main areas, namely: R&D and Innovation Support Programs; Enhancement of R&D Entrepreneurship and Business-University Interface. UPIN has an area called UPIN Ventures responsible for fostering entrepreneurship and where there are some incentive programs like Business Ignition Program (BIP), iUP25K, Startup Buzz, UPTech and Pitch me UP (UPIN UP, 2020).

Block (C) is build up with several initiatives and institutions of excellence, among which stand out:

- FARMA |inove, is an Association of Entrepreneurship and Innovation, Faculty of Pharmacy, University of Porto and is based on an entrepreneurial project with the ambition of creating new and innovative projects in the pharmaceutical area. It is based on qualified and innovative services, investing in staff training and research, innovation and development. The main purpose is to create value in a close relationship with the labour market, being itself an exporter of knowledge and technology within the Faculty of Pharmacy, University of Porto. The brand proves to be dynamic, young, innovative and willing to innovate.
- FEP JUNIOR CONSULTING is a Junior Consulting Company based at the Faculty of Economics. Made up of around 40 students, it is a non-profit association that aims to promote the personal and professional development of its members.
- INEGI is a Research and Technology Organization (RTO), bridging the University-Industry gap and focused on applied Research and Development, Innovation and Technology Transfer activities for the industry. It was founded in 1986, among what are now the Departments of Mechanical Engineering (DEMec) and of Industrial Engineering and Management (DEGI) of the Faculty of Engineering of the University of Porto (FEUP). Being a non-profit private association, recognized as of public utility and having its own team of 200 collaborators, INEGI is an active agent in the development and

consolidation of a competitive model based on knowledge, on high product and process technological content and on technological innovation.

- JA Portugal is an alumni program from Junior Achievement Portugal that inspires and prepares children and young people to succeed in a global economy through transformative experiences based on three fundamental pillars: Citizenship and Financial Literacy, Education for Entrepreneurship and Skills for employability. This program is based on UPTEC but it is not developed by the U. Porto.
- MIETE is a master programme offered by FEUP (Faculty of Engineering) that promotes an integrated training of managers and entrepreneurs through a practical training (hands-on-approach). It is based on solid theoretical concepts and on a permanent and professional supervision, which enable the development of skills and knowledge in order to produce an efficient knowledge and innovation management in new businesses. These high potential new businesses may be developed in existing companies or by starting new companies.
- NEBUP is a youth association that brings together undergraduate students in Biology from the Faculty of Sciences (FCUP) and Aquatic Sciences from the Institute of Biomedical Sciences of Abel Salazar (ICBAS).
- STARTUP BUZZ is an entrepreneurship club, formed by an association of students from FEP (Faculty of Economics). It mainly helps young people with ideas of business in the embryonic phase, through a creative accompaniment using specific tools for that.

Block (D) is linked with Technologies Portfolio and as already mentioned, U. Porto has 240 active patents in five areas, namely: i) Health, Energy, ii) Environment and Construction, iii) Biotechnology and agri-food technology, iv) Information, Communication and electronic technologies and v) Transport and security. THE CIRCLE is a club formed by companies that have emerged from the entrepreneurial and innovative ecosystem of the U. Porto. Many participating companies bear the “U. Porto Spin-Off” brand, which recognizes them as having emerged from U. Porto’s Research & Development and Innovation environment. It is a unique initiative that brings the U. Porto spin-offs together in forums to debate the main challenges facing companies within some of the most dynamic value chains in the world. U. Porto develops its innovation ecosystem in conjunction with these companies, streamlining the exchange of experiences and the improvement of their processes and business.

Block (E) is linked to the Porto Business School, a business school with unique characteristics. Created by a group of 36 organizations, national and multinational and by U. Porto, its mission is to prepare individuals and companies to be agents of change throughout life. This differentiating management model, which combines the pragmatism and real experience of companies with academic rigor and access to the most advanced research allow the ability to stimulate change, combining the know-how with the power to do, anticipating the future and creating the necessary skills for individuals and organizations.

Block (F) involves all competitions and business plan developed within the community. The main actions are the following:

- A2B (Academia2Business) promotes the meeting between research groups and companies with the aim of forming partnerships that ensure greater efficiency of transfer and knowledge valorisation.
- BIP is a Business Ignition Program, a business model iteration program for technologies developed in the academic environment, following the Lean methodology.
- GALA INOVAÇÃO is an event (Gala) assumed as one of the city's main innovation initiatives. The goal is to create a networking environment, which fosters the creation of synergies, capable of bringing

closer the university and the business world.

- iUP25k-University of Porto Business Ideas Competition is an instrument of awareness of entrepreneurship and the creation of new companies based on knowledge and innovation exploration processes. It is one of the most important initiatives at a Portuguese level in the area of entrepreneurship, awarding 25,000 € in prizes and creating conditions for a healthy and positive competition among the best business ideas presented to the competition within the scope of the U. Porto.
- PITCH ME UP is training for a team of entrepreneurs to present the idea of business in the form of pitches, that is, a kind of qualification and training for pitches presentation.
- Start-Up is a Program where Business models are presented and validated with the market, facilitating in this way technology transfer and promoting the creation of new businesses.
- Technological Innovation Award (The Innovator of the Year Award) is mainly a tool for raising awareness about innovation through the acknowledgement of merit, in turn creating an example for the academic community to follow. In fact, the U. Porto has been focusing much effort in promoting invention disclosures by creating structures that encourage and support inventors/researchers, guaranteeing benefits to those who choose to communicate their inventions, such as valorisation and support during the whole commercialisation cycle resulting thereafter.

Block (G) concerns to CEDUP, an Entrepreneurship Club, created in 2007 by students willing to share knowledge and experiences and resources in the attempt to strengthen entrepreneurial actions in U. Porto. It has been responsible for the organization of several events including Innovation and Entrepreneurship Week and Promotion of “CEdUP Talks”, sessions in which participants share their experiences. Its mission is to promote entrepreneurship in the U. Porto, bringing together initiatives, people and companies to create synergies and form a more valuable and efficient ecosystem. Its focus is to make the University of Porto as the main entrepreneurship ecosystem in Portugal and for that it promotes Startup Fest, iUP25k and Fluck up Nights.

Block (H) is UPTEC — Science and Technology Park of the University, a space for business development based on the skills of the U. Porto. This park is divided into four poles: Technological Pole, Creative Industries, Biotechnology Pole and Sea Pole. It fosters the creation and development of business projects in the arts, sciences and technologies, through sharing knowledge, between the university and the market. Since 2007 UPTEC already had supported 600 projects, 79 graduated companies that in 2019 directly employed 2800 high qualified Human resources. UPTEC, in addition to offering its companies general services, also presents more advanced services aimed at consolidating Start-Ups, namely through:

- UPTEC Ace (Startup acceleration program)
- UPTEC Coach (Training and consulting to companies incubated at UPTEC)
- UPTEC Intern (Short term internship program for UP students in companies)
- UPTEC Proto (Support for new product development and rapid prototyping)
- UPTEC Inn (Partnerships and collaboration between investigation units of the U. Porto and the installed companies)
- UPTEC Buzz (Communication support service for installed companies).

### **3.3 Scale Up Porto**

With a novel and integrated vision of the scale up process, University, Local authorities, companies, citizens and other stakeholders, launched together as a first step of a coordinated program for enhancing innovation and



competitiveness creating employment and improving citizens' quality of life: a strategy from Porto that commits the city towards the promotion innovation and entrepreneurship ecosystem. Together, all players are creating a sustainable entrepreneurial ecosystem where cities can work as scaleup catalysts through a program that can be reflected all across Europe.

A Scaleup Porto Manifesto has been created having as main principles Trust, City as a Central Hub, Acces to Talent, Training and knowledge share, Generating Data, Self Assesement and Benchmarking, Building Networks, City as a Lab Living Hub and Funding. In fact in Porto's ecosystem, all the stakeholders are considered to have a unique role, contributing to innovation initiatives and policies on a relevant and peer basis. Government, regional and local authorities, entrepreneurs, educators, researchers, investors, industry and large corporations, can crate the conditions to support scale upa by working together.

Creating highly skilled and developing measures to empower job creation enhance the capacity to access to talent and fostering knowledge exchange and expert advice. Also, the implementation of a system to target, endorse, empower and report matters that concern Generating data bring more knowledge, more dynamic and more capacity to find talent.

Porto is a city of knowledge, with outstanding scientific and academic institutions and great levels of investment in research and development (R&D). In the Porto Metropolitan Area there are 72.935 higher education students (2017), distributed by the University of Porto, Polytechnic of Porto (the two public higher education institutions) and many other private universities. Portuguese scientists are developing cutting-edge research and regularly publish their findings in many of the world's most cited publications: the University of Porto alone accounts for 25% of the scientific publications produced in Portugal (2012-2016). There are 8 technology & knowledge transfer centers in Porto. The municipality government of Porto is a facilitator of innovation, turning the city into a living lab, capable of providing the right infrastructure and access to data and talent as well as funding for fast growing companies; the city is an engine of innovation, where citizens, companies, entrepreneurs and researchers work together to solve real problems.

#### **4. Analysis and Discussion**

The main observed strengths at the University of Porto were the existence of a well-articulated entrepreneurial ecosystem, which includes UPIN, UPTEC, Porto Business School, the Entrepreneurship Club and research funding. Other important factors are related with the regulation on spin-offs, which aims to encourage the creation and support for innovative companies, granting them the seal of identify as linked to the U. Porto. The defined methodology to support entrepreneurs, aiming to systematize the creation process and providing a set of services for promoting the development of technology-based business projects is relevant. Business Ignition Program aims to train entrepreneurs in innovation management and business-oriented entrepreneurship. iUP25k — Business Ideas Competition from University of Porto, an instrument to raise awareness of entrepreneurship and creation of new companies based on knowledge exploration processes and innovation, which has awards in financial resources, international travel and participation in business events.

All these evidences point that he development of entrepreneurship in institutions depends on a set of connected actors and actions shared between these actors, so that conditions are created for the emergence of new ventures. The U. Porto ecosystem can be seen as an extensive set of components, internal and external to the university, and which have the potential to function as a infrastructure to support the creation of technologies and

startups. The components (or actors) of the entrepreneurship ecosystem are people, companies, organizations and relevant processes for the transfer of knowledge and the creation of startups and which are object of integration and interaction efforts with the ecosystem that U. Porto develops through the mobilization of its resource and training base.

Creating highly skilled and developing measures to empower job creation enhance the capacity to access to talent and fostering knowledge exchange and expert advice. Also, the implementation of a system to target, endorse, empower and report matters that concern Generating data bring more knowledge, more dynamic and more capacity to find talent.

Prominent startup supporting infrastructures (incubators, coworking spaces, etc.); In fact, there are dynamic startup communities with regular events, English is widely spoken, the National Health System, i.e., free and the first-class private insurance affordable. Competitive talent from top-level universities, direct flight connections to all of Europe and free Wi-Fi connections available provided by the city is a reality. Only the last year, the network supported more than 1M users and 4G are available everywhere. 40% of Portuguese startups are in Porto (around 300 startups), being 20 incubators, 30 co-working spaces and 65 R&D Centers (Metropolitan Area).

## 5. Conclusion and Future Research

This research pointed out that the role of University of Porto in relation to the increase, diffusion and intensification of activities related to entrepreneurship has a key component in the ecosystem and the knowledge transfer and new business practices. The case of the U. Porto offers insights into the types of agents, institutions, cultures and resources that an entrepreneurial ecosystem contains. In addition, it highlights governance, openness and decentralization of activities that has played a role in supporting student's founders and their high-growth endeavours.

Further studies should be done in what concerns the external environment of U. Porto. This means that deeply study should be done for Porto's city stakeholders, in particular linked with economic, social and environmental impact and values.

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