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From Incubation to Sustainability: a Case-Study of Graduated Companies in Portugal

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Abstract

The purpose of this article is to discuss business incubators as a new way to boost companies and create jobs in a very competitive economic context. From a sociological perspective inspired by concepts such as those of "network" and "social capital", we analyze the entrepreneurial ecosystem as an instrument to overcome challenges during post-incubation. A qualitative research based on a multiple case-study in companies formerly incubated at the Science and Technology Park of the University of Porto (UPTEC) was conducted to analyze the impact of incubation on graduation and growth. The research objective was to understand the importance of business incubators for business sustainability. Our findings show that companies from the UPTEC were strengthened during incubation, particularly as a result of available low-cost services and the reproduction of their networking context through the implementation of business communities after incubation.

Keywords: Incubators; Graduated Companies; Science and Technology Parks; Social Capital; Case Studies.

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1 Introduction

Currently, small and medium sized companies (SMSC) are seen as the economy segment responsible for most job creation and the encouragement of the economic development of territories. Accordingly, the debate around the creation of these companies (Bollingtoft and Ulhoi, 2005) and the best ways to ensure their survival and sustainability during their first years of existence intensified (Barbosa, 2014).

Incubators provide a supportive environment to help entrepreneurs to establish and develop their own projects (Center of Strategy & Evaluation Services [CSES], 2002) offering them a set of facilities, resources, and services (Iacono and Nagano, 2017). Business Incubators (BIs) are generically defined as dynamic organizations that help entrepreneurs to develop their ideas, from its inception to the launching of a new enterprise (CSE, 2001). The BIs have the main goals of avoiding the death of companies in first years of bird due to an extremely competitive environments and helping these organizations to become autonomous (CSES, 2002; Aernoudt, 2004; European Business & Innovation Center Network [EBN], 2010; Epure and Cusu, 2012; Redondo-Carretero and Camarero-Izquierdo, 2017) during start-up. To support and foster business creation, BIs began to be seen as an entrepreneurial tool as they support innovation, development and technology

transfer (CSES, 2002). However, company success and sustainability following graduation and its independence is not guaranteed (Mas-Verdú et al., 2015; Iacono and Nagano, 2017).

Despite the debate about its relationship with entrepreneurship, a systematic and in-depth analysis of the impact of incubation on business sustainability is still lacking. In fact, we know little about how incubation structures, services and resources effectively contribute to the development of entrepreneurial projects in the medium or long term (Phan et al., 2005; Rothaermel and Thrusby, 2005; Schwartz, 2012; Mas-Verdú et al., 2015; Mian et al., 2016; Iacono and Nagano, 2017; Barbosa and Parente, 2018).

In addition, there are multiple incubation models whose differences have not been evaluated and this has not favored unified theories on the subject. This can hinder the clarification of the role of incubators and their influence on the future of incubated businesses (Phan et al., 2005; Mas-Verdú et al., 2015).

Considering these gaps, we intend to answer the research question "*What is the influence of incubation on business sustainability in medium and long terms?*", mobilizing the theory of social capital (e.g. Bourdieu, 1986, 1987, 1980; Bowey and Easton, 2007; Bollingtoft and Ulhoi, 2005) and networks (e.g. Castells, 2007) and the entrepreneurial ecosystem concept (Alvedalen and Boschma, 2017; Moore, 2006).

The two main research objectives are (i) to analyze the incubation services, resources and programs considering the ecosystem of the Science and Technology Park (STP); and (ii) to assess the influence of incubation on business sustainability.

The paper is divided in four different sections: in first part, we discussed incubation process, models and ecosystem approach as well as the application of the social capital and networking theories in this specific context. Then we explained our qualitative methodology as well as the triangulation of techniques applied in the field (direct observations, surveys and interviews) and of information collected. Thirdly, we discuss the results found on the STP of University of Porto, considering the literature review. Finally, the main conclusions, managerial implications, limitations, and future research streams are advanced.

Incubation: actors, models and process

Ecosystem actors as networks. Currently, the analysis of the diverse purposes of incubators led to multiple typologies according to different criteria. These criteria include the actors who structure the BIs (university, industry, stakeholder associations, local power and policies...), the business aims (global/local, profit/non-profit...), the activity sector (activity branches...), the relationship with political policies, the type of funding (capital seed, business angels, banks...), the industry, the infrastructures involved (laboratories, research & development [R&D] units and universities).

The typologies of BIs, designed according to their functions and goals, are also shaped by social, economic and political contexts and opportunities (CSES, 2002; Etzkowitz et al., 2005). This multiplicity of actors and structures, who develop practical and symbolic achievements to strengthen businesses, is metaphorically seen as an *incubation ecosystem* similar to a business ecosystem. Cohen (2006, p.3), a pioneer in the adoption of the concept of business ecosystem, defined it as "...an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures" (as in Alvedalen and Boschma, 2017, p. 887). According to Moore (2006), a business ecosystem can be defined "as a network of interdependent niches that in turn are occupied by organizations" (p.3). The notion of ecosystem emphasizes interdependence and cooperation, referring to a strong and socially dense fabric, that is, to a network of interactions between subjects who organize

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themselves for the effective production of sustainable businesses. These subjects cooperate and conflict with each other, create rules, define ways of doing things, negotiate norms, are in contact and in constant exchange with society. This network of structures and actors creates a social capital where interactions and relationships are based on trust and reciprocity (Putnam, 1993).

Castells (2010) defined a «network» as a set of interconnected nets; the type of «net» depends on the network. Castells (2010) also argued that the network is a dynamic, innovative and open structure that can be indefinitely expanded. Considering the emergence of a new economy as a result of the globalization process, the author claimed that networks are organized according to global networks and capital, management and information (Castells, 2010). As such, work process and work organization are reintegrated through multiple interconnected tasks in different locations, instigating a new division of work based on worker skills.

The external or internal networks of the BIs are crucial for company survival and sustainability (Hackett and Dilts, 2004; Hadmani, 2006; Redondo-Carretero and Camarero-Izquierdo, 2007; EBN, 2010; Schwartz, 2013).

Internal network and social capital. The network metaphor is virtually the best way to characterize the influence of incubation. It enables the analysis of incubators as micro-communities of companies and individuals (Phan et al., 2005) that build social capital together (Bourdieu, 1986).

Bollingtoft and Ulhoi (2005) point out that "the individual entrepreneurial actor has private concerns as well as economic and social interests" (p. 275) that can be facilitated by the incubation structures since s/he has access to internal and external networks when s/he enters incubators and incubation programs (Redondo-Carretero and Camarero-Izquierdo, 2007).

BIs often work as a contact point between entrepreneurs located in the same space, promoting the development of relationships between them. An entrepreneur's network is a habitat for learning resources and opportunities (Bowey and Easton, 2007), as well as for a win-win interaction between incubators.

In this study, inspired by Bourdieu and Coleman, we use the concept of social capital as an empowerment tool for companies to deal with environmental adversities.

Bourdieu (1980) defines social capital as the "set of actual or potential resources related to the ownership of a durable network of more or less institutionalized relationships of inter-knowledge and recognition" (p. 2). The social capital that an individual has and mobilizes depends directly on the networks s/he is part of. These networks allow individuals to access resources, which exist in certain quantities and hold specific qualities.

Bourdieu (1986) points out that capital objectively or subjectively corresponds, in the social world, to the "accumulated labour" (p. 241) or resources that an agent or group of agents hold(s). In stratified societies, the capital of a particular agent can reproduce, accumulate and promote social mobility (Bourdieu, 1987).

Coleman (1990) refers to the quality of networks. He considers that proximity and trust are the qualities that allow the actors involved to reach their objectives more effectively (Portugal, 2007). Similarly, for Putnam, social capital refers to connections between individuals and to the norms of reciprocity and trust that emerge from them (Portugal, 2007). In other words, it corresponds to certain characteristics that facilitate action and cooperation with a view to mutual benefit, resulting from the rules of reciprocity and trust. As Anderson and Jack suggested, 'Social capital seemed to be developed by accumulating knowledge about each other, and by creating space for an appreciation of each other" (2002: 201 in Bowey and Easton, 2007, p.275). Social capital is created and leveraged within a set of social networks, ties and individual / collective structures (Bollingtoft and Ulhoi, 2005) that benefit those who have access to it.

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When applied to entrepreneurs and the business activity, social capital is a resource used in activities (which act as a link between actors and resources) that can include loans, negotiations, exchanges of social and economic resources (Bowey and Easton, 2007, p. 274).

External network: the central role of universities. The institutional context and the external environment of the incubator – including public policies, available venture capital, labor market, R&D centers, innovation and technology – are key-aspects to explain incubation models. In addition, contacts and proximity to industry (Hackett and Dilts, 2004; Hadmani, 2006) can also further the commercialization of the services and products of incubated companies. According to Hadmani (2006), incubators can also work as a link between companies and communities. This is outlined by Mian (1996) in terms of the local economy, once it highlights the contribution of incubation programs to wealth creation in a given geographical area. CSES (2002) also points out that incubators may have the purpose of helping communities and/or individuals who are at a disadvantage, positioning themselves as a support strategy that helps new or inexperienced companies to establish themselves in areas such as community development or urban revitalization (Hadmani, 2006,). The institutional actors of the State and its territorial representatives, namely local authorities, support incubation structures as an engine of territorial promotion and energizing (Parente and Barbosa, 2019) often in partnership with Business Associations and Higher Education Institutions.

Etzkowitz (2002) argue that the development of incubators varies according to their proximity to the university, one of the most important actors in the incubation ecosystem. Rothaermel and Thrusby (2005) highlight the growing number of Science and Technology Parks (STPs) – as they are commonly designated in the academic context –, which reveals the importance of proximity to the university and R&D institutes and centres (Hackett and Dilts, 2004; Hadmani, 2006; Mian, 1996). STPs are organizations aimed at accelerating businesses through (1) knowledge clustering and shared resources (Phan, Siegal, and Wright 2005); (2) product and service development; and (3) technology and knowledge transfer (Barbosa and Parente, 2019). They provide easier access to facilities and specialized knowledge-based services, promoting an extended strategy related to regional and academic development. So, they are part of an (in)formal network of university and industry (Etzkowitz, 2002). These two actors, university and companies, have always been accused of turning their backs to one another. The need to build a relationship between both is commonplace knowledge and the STP offers an answer to such gap (Voisey et al., 2006).

Praised as the University's «Third Mission», «academic incubators» are becoming increasingly crucial to public policies (Vorley and Nelles, 2008). The ways to transfer knowledge from academia to the industry (Allen and McCluskey, 1990; Etzkowitz et al. 2005; Vorley and Nelles, 2008) – one of the purposes of incubation – are critical for universities to contribute to mature and turn spin-offs into successful start-ups (Pauwels et al. 2016). Mian (1996) points out that «academic incubators» can provide a set of business, technical and social services, as well as other inputs from the university's surrounding environment. More recently, Mian et al. (2016) gave some examples of such services, including access to (1) recent scientific knowledge and R&D activity; (2) qualified workforce, such as students, student workers, researchers, experts and faculty consultants; (3) university image; (4) library services; (5) labs and mainframe computers; (6) technology transfer programs; (7) education and training; (8) sports and social activity. So, universities are defined as natural incubators (Etzkowitz, 2002).

According to Grimaldi and Grandi (2005), these incubators are non-profit organizations that aim to foster regional development, create spin-offs and facilitate company access to the market, offering visibility. Academic incubators can also be defined as tools to develop modern technology-based companies (Mian, 1996), which often start out as micro or small businesses. In this sense,

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they are similar to "technology-based incubators", namely due to the support mechanisms that they provide to incubated companies during start-up (Mian et al., 2016). Despite differences, similarities are strong: the «technological-based incubators» may appear as a result of academic research and create spin-offs (Iacono and Nagano 2017). Their main input is also knowledge or, in other words, scientific and technical information. The specificity is highlighted by Aernoudt (2004), who defined a «technology incubator» as an infrastructure that aims to tackle business gaps and foster entrepreneurship while stimulating innovation and the emergence of technological start-ups.

Models and process. The resources and services provided by each incubator define incubation models and programs. On the one hand, different «incubation programs», that is, the set of facilities provided by each incubator, have the double purpose of boosting entrepreneur talent and promote the link between technology, capital and know-how (Bollingtoft and Ulhoi, 2005; Grimaldi and Grandi, 2005). On the other hand, «incubation models» vary according to (1) the company's development process, aims and needs; (2) the process of entry into and exit from the incubator, (3) the sectors involved; (4) the sponsors (Aernoudt, 2004); (5) the incubation ecosystem; and (6) the space-time context (Phan et al., 2005; Hadmani, 2006). These 6 factors significantly change the way the incubation process is organized.

More recently, incubation programs began to focus increasingly not only on the aforementioned tangible factors, but also on high-value intangible services, such as access to advanced skills, learning experiences and networking (Caetano, 2011), and training.

The «incubation process» is defined as a period of company formation and development of the innovation contemplated in pre-selected projects (Iacono and Nagano, 2017). It has an average duration of 3 years divided into three different stages, as shown in figure 1.

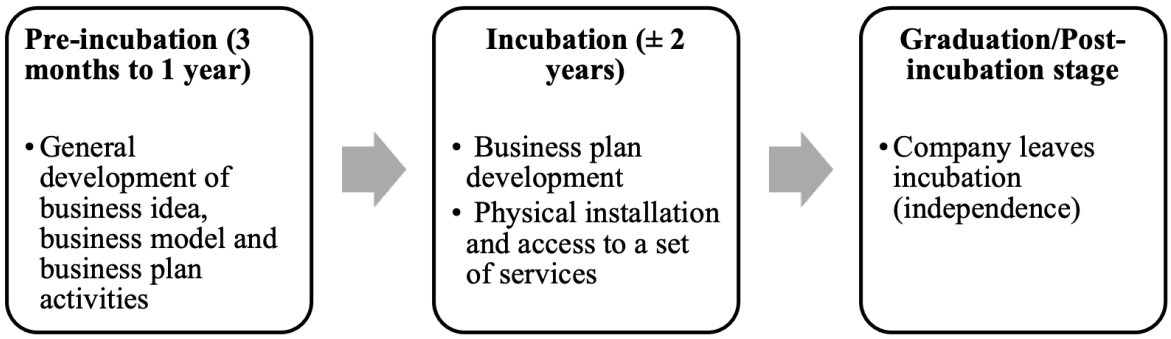

Figure 1. Incubation process and stages. (Adapted from EBN, 2010; Iacono and Nagano, 2017).

During these stages, incubators offer a set of standardized resources, services and skills. However, they may also offer more specific and distinct services according to their clients and available resources (Grimaldi and Grandi, 2005).

Based on a systematic literature review and using a comparative rationale, we summarize the set of resources and services usually provided by incubators in Table 1.

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Table 1. Services and resources commonly offered by incubators.

Service/Resource	Author
Affordable physical space	Mian, (1996), Bollingtoft and Ulhoi (2005), Hadmani (2006), McAdam and McAdam (2008),
Shared space	McAdam and McAdam (2008)
Space with shared equipment	Bollingtoft and Ulhoi (2005), Grimaldi and Grandi (2005)
Financial support - Access to capital (working, support or venture capital) and public or private funding (Government, Research and Development [R&D] partners..., business angels)	CSES (2002), Aernoudt (2004), Bollingtoft and Ulhoi (2005), Grimaldi and Grandi (2005), Hadmani (2006), EBN (2010)
Support and technology transfer	CSES (2002), Voisey et al. (2006), EBN (2010)
Administrative services	Bollingtoft and Ulhoi (2005), Grimaldi and Grandi (2005)
Access to specialized professional services: Business advice, management consulting, legal consulting; Marketing assistance, sales and market studies; Internal or external training (advisory expertise)	CSES (2002), Aernoudt (2004), Bollingtoft and Ulhoi (2005), Grimaldi and Grandi (2005), Hadmani (2006); Voisey et al. (2006)
Creation of management teams	Bollingtoft and Ulhoi (2005), Grimaldi and Grandi (2005)
Internal and external networking	Mian (1996), CSES (2002), Hackett and Dilts (2004), Hadmani (2006), Redondo-Carretero and Camarero-Izquierdo (2007), EBN (2010)

2 Research methodology

This article intends to contribute to fill in the gap of knowledge about the influence of incubation programs on graduated companies[1] from a sociological perspective. Our analysis focused on the Science and Technology Park of the University of Porto (UPTEC). It systematizes the influence of incubation on the sustainability of graduated companies and its importance for their growth.

A qualitative multiple case-study was conducted with the following goals: to understand the importance of incubation and essentially (i) to analyze incubation services, resources and programs considering the ecosystem of the STP; as well as (ii) to assess the influence of incubators on business sustainability.

First, we analyze the incubation structure of the UPTEC, as well as its function as an incubator. In order to do this, we collected data from documents available online in addition to documents provided by its management board (UPTEC, 2015a, 2015b, 2016, 2018, 2020). We also conducted 5 semi-structured interviews, containing questions based on the theoretical framework of the

1. Graduated companies are defined, by UPTEC, as businesses that underwent an incubation process and that have left the incubator infrastructure and/or program, becoming autonomous in the market (Carvalho, 2012).

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research regarding the incubation process and programs offered, to members of the management board.

Due to the lack of a nominal list of the 79 graduated companies incubated at the UPTEC (2021), we resorted to a snowball sampling based on contrasting criteria (Guerra, 2006). The first companies included in the sample were identified by the UPTEC team board. More companies were subsequently identified with the help of the first entrepreneurs interviewed. As a result, we were able to identify a total number of 25 companies that were classified according to 4 criteria: (1) relationship with the market, (2) relationship with the UPTEC, (3) relationship with the entrepreneurial community, and (4) relationship with property owners. These criteria are indicators of their current relationship with the ecosystem. Nonetheless, only 6 of the 25 companies were studied once, after several attempts, it was not possible to enter in contact with all entrepreneurs and founders.

Table 2 shows the classification of the 25 companies including the 6 successful companies that were analyzed for the case-study (companies F, H, J, K O and Q).

Table 2. Graduated companies selected according to contrasting criteria.

Criteria				**Graduated companies**	
Relationship with the market	**Relationship with the UPTEC**	**Relationship with the entrepreneurial community**	**Relationship with property owners**	**Indicated by privileged informants (UPTEC and entrepreneurs)**	**Analytical sample**
Active	*Externalised*	Isolated	Acquired company	Company A Company B	0
			Original owners	Company C Company D Company E Company F Company G	Company F
		Networked	Acquired company	Company H Company I	Company H
			Original owners	Company J Company K Company L Company M Company N	Company J Company K
	Internalized	Networked (Anchor Projects)	Original owners	Company O Company P Company Q Company R Company S Company T Company U	Company O Company Q

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Criteria				Graduated companies	
Relationship with the market	**Relationship with the UPTEC**	**Relationship with the entrepreneurial community**	**Relationship with property owners**	**Indicated by privileged informants (UPTEC and entrepreneurs)**	**Analytical sample**
Inactive	Externalised	-	-	Company V Company W Company Y Company X	0
Total				**25**	**6**

Notes:
Active – graduated companies that survived and are active in the market.
Inactive – graduated companies that did not survive and are inactive in the market.
Externalised – graduated companies that are outside the UPTEC.
Internalized – graduated companies that are located at the UPTEC and maintain their activity (or part of it) there. At the UPTEC, they are known as *Anchor Projects*.
Isolated – graduated companies that work independently in the market.
Networked – graduated companies that are located in the same entrepreneurial community and may share some facilities and services, forming a network.
Acquired company – graduated company that was acquired by another company.
Original owners – graduated company that stayed in the market without being acquired by another company.

In accordance with the multiple case-study methodology (Creswell, 2007; Stake, 1994; Yin, 2009), we studied companies that graduated from the UPTEC, emphasizing their histories, that is, their chronological evolution and activities (Creswell, 2007), their entry into and exit from the STP, their experience of incubation, autonomy and growth, as well as their decision-making processes.

Our attention focused on the entrepreneur, with whom we conducted a semi-structured interview concerning the history and evolution of the company. Each entrepreneur was also asked to fill in a questionnaire designed to collect quantitative data to characterize the company in terms of dimension and results, as well as an evaluation grid to measure his/her satisfaction with the services and resources provided by the UPTEC.

Besides interviews and document analysis, we also conducted a direct observation of the companies' surrounding environment, including the ambience of inter-company relationships and their relationships within the ecosystem. Observation was used in 3 different moments: (i) once at the UPTEC Technological Centre (UPTEC-TECH), where we could see the incubation facilities and conditions; (ii) once at the UPTEC Creative Industries Centre (UPTEC – PINC), where we participated at the UPTEC's Open Day when companies are presented to potential investors and the local community; and (iii) once at one business community, where some companies formerly incubated at the UPTEC are located, during the Open Day.

For each graduated company, we resorted to the triangulation of data collection techniques for a more complete and accurate analysis (Silverman, 2009; Stake, 1994).

All data underwent a content analysis according to Bardin (1975), more specifically a categorical content analysis as well as an enunciation content analysis, with disregard of the formal aspects of language and focusing on the analysis of the themes present in the entrepreneurs' discourse. In other words, we have followed a directed content analysis (Hsieh and Shannon, 2005) once the themes and codes were defined and derived from the theory or relevant research findings. For

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the interviews and direct observations tools, we have produced a grid based on the theoretical framework in regard of the incubation process, the programs offered and the graduation stage.

3 Results and discussion

Our aim was to analyze the role of the UPTEC incubation services, resources and programs considering the ecosystem of the STP for business survival, as well as to assess the influence of this process on business sustainability in the medium and long terms.

3.1 The UPTEC ecosystem: multiple functions linked to university

The UPTEC, the STP of the University of Porto, is a non-profit organization with two partners: the University of Porto and the Portus Park – Rede de Parques da Ciência e Tecnologia e Incubadoras (Barbosa, 2014). This STP began its activities in 2007, as mentioned on the website of the University of Porto. The Park aggregates a set of start-ups and R&D centers. The UPTEC's mission is to foster and support the creation, development and launch of entrepreneurial projects in the fields of art, science and technology by sharing knowledge between the University and the market (as in the UPTEC website). According to recent data published by the UPTEC (2021), so far, more than 600 projects have been supported, 181 projects are currently in incubation and 79 companies have graduated.

The UPTEC has multiple functions and roles that emerge both from its internal and external context, which is strongly linked to the University of Porto, the local productive system of the North Region of Portugal, and much less to municipal policies or the financial system. It is possible to enumerate the following stakeholders when we analyze its website: companies (10) working mainly in the sector of information and communication technologies (ICT), similar company networks linked to the incubator (6), Higher Education Institutions (HEIs) and associations linked to education (5), intellectual property and industry (2), and financial systems (1). No stakeholders (0) related to local power organizations were identified (UPTEC, 2021).

The UPTEC is as an «academic incubator» (Allen and McCluskey, 1990) with a strong collaboration between colleges and industry. This relationship results in the commercialization of research (e.g. UPTEC events in collaboration with the University of Porto) and knowledge transfer to start-up companies established at the STP, such as companies J and Q, which were designed by their founders while they were still attending university. They later developed their business plans and created a spin-off.

There is also an affiliation of the STP to the university and its initiatives can be a complement to university programs.

"Everything was booming inside the University of Porto, right? The Master in Innovation and Entrepreneurship from the Faculty of Engineering, University of Porto, which owns the UPTEC. And so, I think that was it: the ecosystem was working" (company J).

The STP also offers a set of services commonly offered by «academic incubators» (as in Mian et al., 2016), including access to physical space, such as laboratories, and to research group networks, as seen in table 4. The Park facilities are located at the University of Porto pole where other schools can be found. From the 14 colleges and 1 business school of the UP, 6 colleges are located there. Among these, one finds those most demanding in relation to the business world, such as the Faculties of Engineering, Economics and Management, as well as those that develop internationally renowned R&D, such as the Faculty of Medicine and its laboratories (e.g. the IPATIMUP and the I3S).

The UPTEC can also be considered a «University Based Incubator» (Grimaldi and Grandi,

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2005) due to its mission, the services it provides and its funding sources. Four companies were start-ups created by graduate engineer students from the UP. Two of them were academic spin-offs since they were planned during course attendance. All companies work in the services sector and pursue knowledge-intensive activities (table 3), resulting from the collective projects of 2 to 4 entrepreneurs who were sometimes "college friends":

"I was challenged to create this company by a former colleague and friend, with whom I had formed my college's alumni association, (. . .) his company was also at the UPTEC when I joined in" (company J).

Its integration in the UPTEC promotes the entry of projects into the market by giving them some visibility closely associated with the excellence of the institution in training qualified human resources characterized by updated and cutting-edge skills and knowledge.

"Obviously, being associated with the University of Porto was an asset for us" (company K).

"the other reason was access to Higher Education students of the University of Porto because, in 2007, the marketing digital area (. . .), it was not easy to find people with this training (. . .) and we still have to provide training. But, being close to this University was a way to attract students" (company O).

"The UPTEC is a place where I could get some help and support in terms of entrepreneurship (. . .) [because I] didn't have a graduation in the field, or entrepreneurship skills" (company F).

The services and resources provided are both tangible and intangible (table 4) and linked to the university. For instance, there are «Innovation Centers» located at UPTEC. The Innovation Centers are R&D/innovation offices belonging to already established companies, such as AgoraPlus, AMT Consulting, or Bliss Application (UPTEC, 2020). These companies can benefit from the synergies between the R&D centers, innovation departments and interface institutes of the University of Porto (UPTEC, 2020). As an example, the AMT Consulting company highlights the importance of the synergies between it and University of Porto for its growth strategy: "based on the creation of innovative products (. . .) we started up AMT Labs at the UPTEC's Innovation Centre, which provides an environment for creativity, innovation and technology improvement. At AMT Labs, we intend to develop projects in partnership with the University of Porto and the UPTEC companies, as well as to retain the Engineering and Design Talents of the University through internships and hiring." (UPTEC, 2021).

More than a «basic research incubator», defined by Aernoudt (2004) as an incubator that deals with a discovery gap by promoting the emergence of spin-offs, the UPTEC resembles a «technology incubator». In fact, a «technology incubator» is an incubator that fosters innovation, entrepreneurship and technological start-ups besides stimulating graduates to become entrepreneurs (Aernoudt, 2004). A good example of this are the «Anchor Projects», which "due to their dynamic were invited to stay in the STP" (Business Development Assistant of UPTEC). Anchor Projects promote the UPTEC network (Carvalho, 2012) and a learning habitat (Bowey and Easton, 2007).

As such, we conclude that the core function of the UPTEC is to promote innovation and university-oriented entrepreneurship, as well as the emergence of technological start-ups.

Such particularities are characteristic of the 6 entrepreneurial projects that were analyzed.

Considering the companies upon their entry in the UPTEC, we find that all except company F were in the «incubation stage» (EBN, 2010; Iacono and Nagano, 2017). Companies J, K, H, Q and O were developing their business plans and had access to services provided by the UPTEC. Only company F was in a «pre-incubation stage» (EBN 2010; Iacono and Nagano, 2017), thus beginning to design its business model and proceeding with market validation (Carvalho, 2012).

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Table 3. Entrepreneurial projects analyzed. (Interviews and UPTEC, 2015a, 2015b, 2016, 2018).

Company	Type of project in the entrance time at UPTEC	Entry year at UPTEC	Exit year of UPTEC	Main activity
Company J	Academic spin-off	2011	2013	Software programming
Company K	Start-up	2012	2016	Software programming and other activities related to information technology
Company H	Start-up	2012	2015	Computer consulting, management of technological equipment and other activities related to information technology
Company Q	Academic spin-off	2011	Still in UPTEC (Anchor Project)	Research and vocational training Engineering
Company F	Start-up	2009	2014	Property evaluation and other consulting activities
Company O	Start-up	2008	Still in UPTEC (Anchor Project)	Digital marketing, business and management consulting

3.2 The UPTEC incubation model and process

The UPTEC incubation model was divided into 4 stages: admission, pre-incubation, acceleration and graduation (Carvalho, 2012) in accordance to Figure 1. The average duration of incubation is 3 years, but it can be extended up to 5 years. The 6 successfully graduated companies that were studied were incubated for 3 years, on average (table 3).

At the UPTEC, start-ups and spin-offs had access to a set of services, equipment and technical support apart from incubation programs. Table 4 shows the entrepreneurs' assessment of the services and resources offered by the UPTEC using a scale from 1 (not important) to 5 (very important).

Confirming what is mentioned by current literature, the «need of physical space» is one of the main reasons to choose the UPTEC; «rent value» was the best rated service and «facilities (location and space)», as well as «logistic services (security, mail, cleaning services...)» were second best.

Intangible services were usually the best rated. For example, access to «mentoring» and «access to shared experiences and strategies» were regularly considered very important; both the «proximity to the UPTEC networks and partners» and «visibility for potential partners» scored 3.3 points, on average.

This underlines the role of networking and network formation as a leading principle of business establishment and development (Hackett and Dilts, 2004; Hadmani, 2006; Redondo-Carretero and Camarero-Izquierdo, 2007; EBN, 2010; Schwart,z 2013). In some cases, networking only took place after entering the UPTEC and improved during incubation. Networking during incubation materialized in: (1) contact between the founders and their teams and other companies and

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Table 4. Importance of the services and resources provided by the UPTEC. (Evaluation grid).

Services/Resources	Average
Rent value	3,8
Mentoring	3,57
Facilities (location and space)	3,4
Logistic services (security, mail, cleaning service...)	3,4
Proximity to UPTEC networks and partners	3,3
Visibility for potential partners	3,3
Access to shared experiences and strategies	3,1
Proximity to the UPTEC team	3
Proximity to the university	3
Overall environment promoted by the UPTEC	3
Shared space quality	2,6
Communication and press office support	2,6
Access to and attendance of training, seminars, conferences	2,5
Access to technology	1,5

mentors; (2) the occasional hiring of services from surrounding start-ups, which in some cases led to partnerships (some of which extended after graduation); (3) meetings between companies; and (4) the mentoring program.

An entrepreneur net is a learning system that allows him/her to identify opportunities and gain access to resources (Bowey and Easton, 2007). The entrepreneurs highlighted the UPTEC's role in building such networks.

In fact, the UPTEC facilitated contacts and promoted linkage between incubated companies and external organizations.

"The UPTEC always provided the opportunity to create a network, to exchange contacts, to understand the needs of incubated companies (. . .) There are many companies with whom we began to work because the UPTEC recommended them to us" (company K).

Tangible resources were typically worst rated, including (1) «access to technology»; (2) «access and attendance of trainings, seminars, conferences»; (3) «communication and press office support» and «shared space quality».

One of the criticisms of the entrepreneurs for the continuation of their business trajectory is the undervaluation of networks external to the university, namely the relationship with the local political power and the financial system:

"promotion should cover other external networks, not those exclusively linked to the university or to the Park itself (. . .) that support should be scaled-up" (company O).

3.3 Successful graduated companies: the importance of business communities for sustainability

According to the life-cycle theory, the companies under analysis seem to have been successful during incubation (the entrepreneur stage) considering one of the most used indicators: job creation (Lu and Wand, 2018). All companies perform positively on job creation (table 5.). The UPTEC highlights that more than 2700 jobs have been created since 2004, as referred on its

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website, and most companies under analysis have grown in number of workers. These data confirm one of the strongest characteristics of SMSCs (OECD, 2019), which by itself alone justifies the existence of incubation policies.

Table 5. Number of workers per company. (Survey).

Companies	Number of founders	Initial number of workers	Number of workers (by December 2018)
Company J	4	2	5
Company K	4	0	15
Company H	2	2	13
Company Q	2	4	11
Company F	2	0	1
Company O	2	6	50

Nevertheless, even for successful companies, exiting the UPTEC brought along difficulties linked to the:

- Maximum length of incubation: *"We left the UPTEC still during stabilization, that is, we left more due to exit deadlines than because we were ready to leave"* (company J).
- And preservation of the network and partners/stakeholders: "[difficulties in] *finding a place (. . .) where we could have access to* [networking] *and be able to talk to and help each other"* (company H).

The literature considers several factors to be determinant for company development and performance. These include access to funding and other financial factors (Ayatse et al., 2017; Organização Internacional do Trabalho, 2018) and to the international market since this foster's productivity, efficiency and innovation intensity (Mas-Verdú et al., 2015). As such, what did it mean for these companies to be part of an incubation ecosystem?

All entrepreneurs pointed out that networks and contacts are indeed important for the survival of their projects. Except for companies O and Q, which remain in the UPTEC as Anchor Projects (due to their dynamics, they are seen as enhancers of the UPTEC network as a learning ecosystem), companies J, H and K established their activity in the same building, fostering the creation of a micro business community.

Company K's CEO highlights that, after leaving the UPTEC, *"we kept our network that has an UPTEC component, but we expanded it".*

This business community was founded by entrepreneurs whose projects were incubated at the UPTEC and who, due to post-incubation difficulties, namely finding a physical space, decided to replicate the UPTEC ecosystem. Despite this shared particularity, the 3 companies (J, H and K) have very distinct independence processes. This shows the absolute importance of maintaining the network and the social capital that it mobilizes. After graduating and before entering this entrepreneurial community,

- Company J had to enter an acceleration program at another academic incubator in Porto.
- Company H was bought by an international company through a network of contacts after engaging in the entrepreneurial community. It pursues its original activity.
- Company K's CEO stated that the independence of the company was not difficult, engaging in the entrepreneurial community immediately after leaving the UPTEC.

This need to come together after incubation and recreate previous networks, shows that social capital is as important as economic capital for company sustainability. It is an intangible asset

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that grouping into business communities can provide.

The STP environment promotes team spirit and a culture closely linked to academic environments, namely by offering diverse formal and/ or informal training programs (e.g. seminars and conferences, internships). This organizational culture is strengthened by events (e.g. the UPTEC Net program - Activities and events to foster internal and external networking), leisure programs and sports activities that promote cooperation, trust and teamwork.

The entrepreneurial culture experienced is marked by traits of youth associated with irreverence and the characteristic risk of innovative companies and potential entrepreneurs. This is portrayed in the facilities of the STP whose open work spaces often coexist with multifunctional leisure areas. Flipcharts harmonize with sofas (puffs), television and ping-pong tables.

"On the ground floor, we could see a co-working space, meeting rooms and an auditorium, as well as the cafeteria (with TV and microwave) and the security area. Close to the cafeteria, there is also a leisure area with a ping-pong table. (...) In most offices, the division between the corridor and the workspace is a glass 'wall'" (Observation record 1).

This culture is reproduced in the business community in an openness and celebration mood that is lived and nurtured. This promotes proximity and strengthens group integration.

"During the Open Day we attended, "there was a 'Pizza Fest!' [at the business community cafeteria]. Pizza was offered to all participants in the event in an informal setting" (observation record 2).

The UPTEC creates an internal environment that promotes relationships of trust and reciprocity as a strong asset for business support:

"An interesting thing that we have been observing, and that I believe supports the longevity of some projects, is a cooperation culture and teamwork (. . .) this has had some effects" (Head of Business Development-Arts UPTEC).

On the other hand, Anchor Projects (companies Q and O) underwent a different graduation process because they were invited to continue at the UPTEC due to their dynamic, as stated during the interviews to the UPTEC team members. These entrepreneurs claimed that keeping their activities in the STP was important because it allowed them (i) to continue networking with other companies and (ii) retain a close contact with the university (e.g. these companies host curricular and professional internships). Besides the internal network, these companies benefit from external networks, namely the University of Porto brand and its reputation in the business ecosystem.

Finally, company F was the only company that neither stayed at the UPTEC, nor became part of an entrepreneurial community. During post-incubation or graduation, company F moved to the city center in Porto and continues to develop its activities maintaining one of its founders and hiring another collaborator. Its CEO claims that transition to the market was not turbulent and that it was easy to develop the company's products.

Underlining the importance of preserving the relationship between the graduated company and the incubator for medium and long terms sustainability (CSES, 2002; EBN, 2010), the entrepreneurs stated that (i) contact between the UPTEC and the company is occasional and informal (companies J and F) and that (ii) the incubator resources or services were no longer used (company K and H). In other words, there is a certain disconnection between the graduated company and the STP.

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4 Conclusions, implications and future research

4.1 Conclusions

In this paper, we set out to determine "*What is the influence of incubation on business sustainability in the medium and long term?*". For this, we mobilized the theories of social capital and networks within an entrepreneurial ecosystem. Our first finding is that incubation at UPTEC strengthens incubated companies. Although incubation does not guarantee sustainability, as argued by some studies (e.g. Mas-Verdú et al., 2015), it does offer a set of conditions that reinforce the company's ability to grow sustainably during the graduation stage.

Despite being successful companies, as shown by the employment creation indicator, a set of internal and external contingencies affects business sustainability. In fact, with graduation companies lose the advantages provided by the physical incubation structure, namely its lower costs in terms of space, service range, access networks and STP partners. At the same time, companies find it difficult to raise funds and sell their services in the market.

As illustrated by the survey carried out, the 6 companies were strengthened both during and after incubation. According to the founders, this is mainly due to networking and partnerships – that is, social capital – as well as access to physical space at affordable prices when financial resources are still scarce. Entrepreneurs carry a set of networks with them: their experience at UPTEC has raised awareness of the importance of maintaining a network of relationships and the benefits of a collective project. It is for this reason that, to overcome growth difficulties, some entrepreneurs decided to reproduce the networking context by creating business communities after the incubation stage.

At the same time, skills such as teamwork and the promotion of a cooperative culture stimulated and/or developed during the incubation period at UPTEC are also relevant to the success of graduated companies. This confirms the importance of social capital and its quality (in terms of trust and reciprocity) to strengthen the sustainability of companies. It is another intangible resource that reinforces the ability to face adversity during growth.

Therefore, it is possible to conclude that the incubation structure works mainly as a supplier of intangible resources, with emphasis on social capital.

4.2 Managerial and political implications

One of the managerial implications refers to the importance of incubators to internally promote cooperation between business projects during the incubation period (Soetanto and Jack, 2013). In fact, like Rijnsoever (2019) and Hansen et al. (2000) point out, in the context of «network incubators», companies must remain interconnected in a network to facilitate the flow of knowledge and the exchange of experience. As our results suggest, although the UPTEC is analyzed as an STP with the role of academic or university-based incubator, it has an important role in promoting networks between incubated companies and in establishing strategic partnerships, providing what Hansen et al. (2000) define as *unique networking benefits*.

Considering the graduation stage, and as highlighted in other studies (Bollingtoft and Ulhoi, 2005; Bowey and Easton, 2007), ours suggests that incubation structures should invest more in a post-incubation culture to preserve, in different ways, the benefits of incubation. For example, soft skills training programs (such as team management, democratic and participatory culture, or emotional intelligence) that promote or improve networking after leaving the incubation program were mentioned by companies J, K and H as important services to be provided during business incubation in order to consolidate relationships during growth.

Another implication refers to the preservation of the relationship between the incubator and

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the company after graduation, which is considered important for the company's sustainability (EBN, 2010). In our case studies, this relationship is not maintained (companies F, H, J, K) or is maintained superficially (companies O and Q). As our results suggest, the replication and maintenance of an entrepreneurial ecosystem created during incubation is key for the sustainability and growth of companies in the post-incubation period.

As several studies point out, STPs and BIs are interdependent on the external environment (e.g. Phan et al., 2005; Al-Baimani et al., 2021; Fernández et al., 2019). Thus, national and regional experiences in terms of industry characteristics and surrounding structures influence the way in which incubation structures are developed and analyzed (Hadmani, 2006). One of the criticisms made to the UPTEC was the undervaluation of networks outside the academic context, namely credit agencies. In this sense, considering a comprehensive entrepreneurial ecosystem, it is important to understand how business incubation contributes to regional and entrepreneurial policies (Fernández et al., 2019) and vice versa. It is equally important not to disregard the business function that universities acquire for the development of public policies (Vorley and Nelles, 2008) within the scope of the "Third Mission" (Etzkowitz et al., 2005). Therefore, it is recommended that BIs and other incubation structures invest in long-term relationships with other partners by fostering networking with industry, venture capitalists, local institutions, among others, to promote the sale of products and services offered by incubated companies (Hackett and Dilts, 2004).

4.3 Limitations and lines of future research

To have a complete understanding of a company's graduation and sustainability processes, it would be necessary to have a more diverse case-study. One limitation of this study was the difficulty in contacting companies that did not survive graduation, as well as isolated and acquired companies. If the latter points to successful trajectories, the former limits the lessons to be learned from business failure. Based on the *growth-mindset approach*(Dweck, 2019) and an understanding of learning from failure (Edmondson, 2011), it is critical to analyze the causes that led to business failure in order to reorganize and revitalize organizations, as well as to innovate.

The lack of contact with entrepreneurs whose companies did not survive may be an indicator of the taboo on business failure. Unlike other societies, namely the North-American one (Burchell and Hughes, 2006), in Portugal, failure still seems to be highly stigmatized. Thus, it was not possible to discuss the impacts of incubation on growth from the perspective of unsuccessful post-incubation companies. We believe that conducting qualitative studies that include unsuccessful graduated companies, as well as isolated and acquired companies, is essential to fill the gap in understanding the influence of incubation.

Additionally, carrying out a longitudinal study of the graduated companies would be relevant to analyze their evolution, their autonomization process and the impact of incubation over time. For this, it is essential that incubation structures follow-up the graduated companies and systematize the information collected.

It would also be interesting to carry out a benchmark study on the influence and impact of the incubation process on companies that have been in BIs or accelerators since although the purpose of these structures is the same, the programs and structures offered are different.

5 References

Aernoudt, R. (2004). Incubators: Tool for Entrepreneurship?. *Small Business Economics*, (23), 127-135.

http://creativecommons.org/licenses/by/3.0

Al-Baimani, N., Clifton, N., Jones, E., & Pugh, R. (2021). Applying the ecosystem model in a new context? The case of business incubation in Oman. *Growth and Change, 52*(2), 663-686.

Allen, D. N., & McCluskey, R. (1990). Structure, Policy, Services and Performance in the Business Incubator Industry. *Entrepreneurship Theory and Practice, 15*(2), 61-77.

Alvedalen, J., & Boschma, R. (2017). A critical review of entrepreneurial ecosystems research: towards a future research agenda. *European Planning Studies, 25*(6), 887-903.

Ayatse, F. A., Kwahar, N., & Iyortsuun, A. S. (2017). Business incubation process and firm performance: an empirical review. *Journal of Global Entrepreneurship Research*, *17*(2), 1-17.

Barbosa, G. (2014). *Dinâmica organizacional e de incubação do Parque de Ciência e Tecnologia da Universidade do Porto* [Master Thesis, University of Porto, Portugal]. Repositório Aberto da Universidade do Porto.

Barbosa, G., & Parente, C. (2018). Organizational Configuration and Relationship with the Environment: Case Study of the Science and Technology Park of the University of Porto". In H. Almeida & B. Sequeira (Eds.), *The Role of Knowledge Transfer in Open Innovation*, (pp.245-261). United States of America: IGI Global.

Bollingtoft, A., & Ulhoi, J.P. (2005). The networked business incubator – leveraging entrepreneurial agency?. *Journal of Business Venturing, 20,* 265-290.

Bourdieu, P. (1980). Le capital social. *Actes de la Recherche en sciences sociales*, (31), 2-3.

Bourdieu, P. (1986). The forms of capital. In J. Ricardson (Ed.), *Handbook of Theory and Research for the Sociology of Education*, (pp.241-258). Westport, CT: Greenwood.

Bourdieu, P. (1987). What Makes a Social Class? On the Theoretical and Practical Existence of Groups. *Berkeley Journal of Sociology, 32*, 1-17.

Bowey, J., & Easton, G. (2007). Entrepreneurial Social Capital Unplugged: An Activity-based Analysis. *International Small Business Journal, 25*(3), 273-306.

Burchell, B., & Hughes, A. (2006). *The stigma of failure: international comparison of failure tolerance and second chancing* (Working Paper no. 334). Center for Business Research, University of Cambridge, Programme on Enterprise and Innovation.

Caetano, S. (2011). *Incubadoras de Empresa e modelos de Incubação em Portugal: Incubadoras Regionais versus Universitárias*. [Master Thesis, University of Algarve, Portugal] Sapientia Universidade do Algarve.

Carvalho, P. (2012). *Estudo de Impacto Económico do UPTEC – Parque de Ciência e Tecnologia da Universidade do Porto*. [Unpublished manuscript] Parque da Ciência e Tecnologia da Universidade do Porto.

Castells, M. (2010). *The rise of the network society*. Malden: Willey-Blackwell.

Center for Strategy & Evaluation Services. (2002). *Benchmarking of Business Incubators.* Accessed October 2018. http://ec.europa.eu/DocsRoom/documents/2769/attachments/1/translations/en/renditions/pdf.

Clarysse, B., Wright, M., Lockett, A., Velde E., & Vohora, A. (2005). Spinning out new ventures: a typology of incubation strategies from European research institutions. *Journal of Business Venturing,* (20), 183-216.

http://creativecommons.org/licenses/by/3.0

Coriat, B., & Weinstein, O. (1995). *Les nouvelles théories de l'entreprise.* Paris: Le Livre de Poche.

Costa, E. M. & Agostinho, R. (2005, September). *A rede de Parques da Ciência e Tecnológia em Portugal e Espanha um estudo comparativo* [Conference Sessions]. X Colóquio Ibérico de Geografia, Associação Portuguesa de Geógrafos, University of Évora, Évora, Portugal.

Creswell, J. W. (2007). *Qualitative Inquiry and Research Design: Choosing Among Five approaches*. Nebraska: SAGE Publications.

Drucker, P. (1985). *Innovation and Entrepreneurship: Practice and Principles*. New York: HarperCollins Publishers.

Dweck, C. S. (2019). The Choice to Make a Difference. *Perspectives on Psychological Science, 14*(1), 21-25.

Edmondson, A. C. (2011). Strategies for Learning from Failure. *Harvard Business Review, 89*(4), 48-55.

Epure, D., & Cusu, D. (2010). Growth Factor of the Viability of SME's. *Annal of Eftimie Murgu University Resita, Fascicle II, Economic Studies*, 224-231.

Etzkowitz, H. (2002). Incubation of incubators: innovation as a triple helix of university-industry-government networks. *Science and Public Policy, 29*(2), 115-128.

Etzkowitz, H., Mello, J. M., & Almeida, M. (2005). Towards "meta-innovation" in Brazil: The evolution of the incubator and the emergence of a triple helix. *Research Policy, 34*, 411-424.

European Business & Innovation Center Network. (2010). *Smart Guide to Innovation-based Incubators (IBI).* Accessed September 2018. https://ec.europa.eu/regional_policy/sources/docoffic/2007/working/innovation_incubator.pdf.

Fernández, M. T., Santos, J. L., & Jiménez, F. J. (2019). Performance of business incubators and accelerators according to the regional entrepreneurship ecosystem in Spain. *Investigaciones Regionales – Journal of Regional Research,* 43, 41-56.

Grimaldi, R., & Grandi, A. (2005). Business incubators and new venture creation: an assessment of incubating models. *Technovation,* (25), 111-121.

Guerra, I. C. (2006). *Pesquisa Qualtitativa e Análise de Conteúdo – Sentido e formas de uso*. Estoril: Princípia Editora.

Hackett, S. M., & Dilts, D. (2004). A Real Option-Driven Theory of Business Incubation. *Journal of Technology Transfer*, (29), 41-54.

Hamdani. D. (2006). *Conceptualizing and Measuring Business Incubation.* (Working paper). Science, Innovation and Eletronic Information Division, Statistic Canada.

Hansen, M.T., Chesbrough, H.W., Nohria, N. & Sull, D.N. (2000). Networked incubators: hothouses of the new economy. *Harvard Business Review, 78*(5), 74-84.

Hsieh, H. F., & Shannon, S. E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, *15*(9), 1277-1288.

Iacono, A., & Nagano M. S. (2017). Pós-incubação de empresas de base tecnológica: um estudo de caso sobre o efeito da incubadora nos padrões de crescimento. *Gest. Prod., 34*(3), 570-581.

Lu, X., & Wand, J. (2018). A Review of the Classification of Enterprise Life Cycle. *Modern*

http://creativecommons.org/licenses/by/3.0

Economy, 9(7), 1169-1178.

Mas-Verdú, F., Ribeiro-Soriano, D., & Roig-Tierno N. (2015). Firm survival: The role of incubators and business characteristics. *Journal of Business Research,* (68), 793-796.

McAdam, M., & McAdam, R. (2008). High-tech start-ups in University Science Park incubators: The relationship between start-up's lifecycle progression and use of the incubator's resources. *Technovation*, (28), 277-290.

Mian, S. A. (1996). Assessing value-added contributions of university technology business incubators to tenant firms". *Research Policy*, 25, 325-335.

Mian, S. A., Lamine, W., & Fayolle, A. (2016). Technology Business Incubation: An overview of the state of knowledge. *Technovation, 50*(51), 1-12.

Ministério da Segurança Social e do Trabalho and Departamento de Estudos, Estatística e Planeamento (2003). *Indicadores de empreendedorismo e inovação: Relatório Final*. Lisboa: Cogitum.

Moore, James F. (2006). Business ecosystems and the view from the firm. *The Antitrust Bulletin, 51*(1), 31-75.

Organização Internacional do Trabalho. (2018). *Trabalho Digno em Portugal 2008-2018: da crise à recuperação*. Accessed June 2019. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_647524.pdf.

Organization for Economic and Co-operation Development. (2019). *OECD SME and Entrepreneurship Outlook 2019*. Accessed June 2019. https://www.oecd-ilibrary.org/sites/34907e9c-en/1/1/6/index.html?itemId=/content/publication/34907e9c-en&_csp_=97b1ca7ff34abaf04c3b6ec7089258c9

Parente, C., & Barbosa, G. M. (2019). "Incubadoras de empresas como instrumento de política pública: análise da orientação empreendedora governativa". In Parente, C. et al. (Eds.), *Sociologia, Economia e Gestão. Diálogos Transversais entre Brasil e Portugal* (pp.85-114). Curitiba: Editora CVR.

Pauwels, C., Clarysse, B., Wright, M., & Hove, J. V. (2016). Understanding a new generation incubation model: The accelerator. *Technovation, 50*(52), 13-24.

Phan, P., Siegal, D., & Wright, M. (2005). Science parks and incubators: observations, synthesis and future research. *Journal of Business Venturing,* (20), 165-182.

Portugal, S. (2007). Contributos para uma discussão do conceito de rede na teoria sociológica. *Oficina do CES nº271*, 271, 3-37.

Redondo-Carretero, M., & Camarero-Izquierdo, C. (2017). Relationship between Entrepreneurs in Business Incubators. An Exploratory Case Study. *Journal of Business-to—Business Marketing*, *24*(1), 57-74.

Rijnsoever, F. J. (2020). Meeting, mating and intermediating: How incubators can overcome weak network problems in entrepreneurial ecosystems. *Research Policy*, *49*(1), 1-15.

Rothaermel, F.T., & Thursby, M. (2005). Incubator firm failure or graduation? The role of university linkages. *Research Policy*, (34), 1076-1090.

Schwartz, M. (2012). A control group study of incubators' impact to promote firm survival. *Journal Technol Transf*, (38), 302-331.

http://creativecommons.org/licenses/by/3.0

Silverman, D. (2009). *Interpretação de dados qualitativos: método para análise de entrevistas, textos e interações*. Porto Alegre: Artmed Editora S.A.

Stake, R. E. (1994). Case Studies. In N. K. Denzin, N. K. & Lincon, Y. S. (Eds.), *Handbook of Qualitative Research*. California: SAGE Publications.

Soetanto, D. P. & Jack, S. (2013). Business Incubators and the Networks of Technology-Based firms. *Journal of Technology Transfer 38*(4), 432-453.

UPTEC. (2015a). *Portefólio de empresas 2014*. Accessed April 2019. https://issuu.com/uptec_porto/docs/port

UPTEC. (2015b). *Portefólio de empresas 2015*. Accessed April 2019. https://issuu.com/uptec_porto/docs/port

UPTEC. (2016). *Portefólio de empresas 2017*. Accessed April 2019. https://issuu.com/uptec_porto/docs/porte

UPTEC. (2018). *Portefólio de empresas 2018*. Accessed April 2019. https://issuu.com/uptec_porto/docs/porte 08-23_pages.

UPTEC. (2020). *Portefólio de empresas 2020.* Accessed January 2021. https://issuu.com/uptec_porto/docs/up

UPTEC. (2021). *UPTEC*. Accessed January 2021. https://uptec.up.pt/.

Voisey, P., Gornall L., Jones, P., & Thomas, B. (2006). The measurement of success in a business incubation project". *Journal of Small Business and Enterprise Development, 13*(3), 454-468.

Vorley, T., & Nelles, J. (2008). (Re)conceptualizing the academy: Institutional development of and beyond the third mission. *Higher Education Management and Policy, 20*(3), 1-17.

Yin, R. (2009). Case study research: design and methods. London: Sage.

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