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ENTREPRENEURSHIP AND ENTREPRENEURIAL ECOSYSTEMS: CASE STUDY

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RESUME
The promotion of conditions that encourage the creation of new companies, support their rapid growth and their innovative capacity has received special attention from several public and private entities. This interest is based on the expectation of business and social regeneration and on the economic growth of the regions where these new companies are created. The conditions for its appearance and growth depend on a set of actors that often include universities, investors, incubators, public entities, among others. This finding culminated, in academic terms, in an emerging entrepreneurial ecosystem approach that focuses on understanding how contexts affect entrepreneurship. This article seeks to understand the relationship between entrepreneurship and entrepreneurial ecosystems and the way in which these phenomena try to explain the creation of new companies. The main objective of this article is to understand how different configurations of the ecosystem (Coimbra and Sines) produce results with specificities and characteristics.

Keywords: Entrepreneurship, Entrepreneurial Ecosystem; Entrepreneurs, Incubators; Startups

1. INTRODUCTION

There is a global and growing interest in encouraging the creation of new organizations (business and social) and stimulating their growth and their capacity for innovation. This interest has been common to politicians, academics, entrepreneurs and citizens, with different approaches, both from the point of view of the concept and its use. While governments seek to derive political dividends from some job creation resulting from the creation of new companies, researchers try to understand the phenomenon in its multiple aspects from different perspectives, occupying a prominent place in the research agendas of academics from different

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disciplines such as, economics , management, psychology and sociology (KNIGHT, 1921; SCHUMPETER 1934, 1943; MCCLELLAND, 1961; KIRZNER, 1973; CASSON, 2005).

However, there seems to be a common expectation between the agents and entities involved in the study of entrepreneurship and the entrepreneurial process: a positive relationship between entrepreneurship and economic development.

Despite this, at the same time that some studies show this relationship (AUDRETSCH, 2007; BRAUNERHJELM et al, 2010; ACS et al., 2012), especially in developed economies, there are other studies that seem to contradict it. For example, in the latest GEM report (GEM, 2017/18), it appears that the five countries with the Early-Stage Entrepreneurial Activity Rate (TEA[1]) higher[2]mostly have very low GDP per capita and low levels of economic and social development. In contrast, the five countries with the lowest ASD[3], are developed countries with higher GDP per capita, with the exception of Bosnia and Herzegovina.

One of the explanatory factors for the aforementioned differences is the orientation of policies to support entrepreneurs, where governments and other entities responsible for promoting entrepreneurship have a crucial role. However, there are other factors that explain these variations between geographically close countries, intrinsically linked to the history and culture of each country, region and even places with their own specificities within each country. These specificities are often linked to the context in which entrepreneurs operate and can be called entrepreneurial ecosystems (EE) (DUBINI, 1989).

The fundamental ideas behind entrepreneurial ecosystems were developed in the 1980s and 1990s. From research based on the personality of the entrepreneur, we moved to a broader perspective that incorporated the role of social, cultural and economic forces in the entrepreneurial process (DODD & ANDERSON , 2007) and as part of a more comprehensive view of entrepreneurship as a social process embedded in broader contexts (NIJKAMP, 2003; STEYAERT & KATZ, 2004).

This new perspective laid the foundations for the study of entrepreneurial ecosystems, which, according to Isenberg (2010), can facilitate the creation of new companies, when well developed and coordinated. It means that the presence of certain conditions and entities in a given territory being a necessary condition is not enough as it is essential the interaction and

[1] TEA (Total early-stage entrepreneurial activity) - The Early-Stage Entrepreneurial Activity Rate measures the proportion of adults (between 18 and 64 years old) who are involved in a start-up process (nascent business) or in management of new and growing businesses in each participating country (GEM, 2017/2018).

[2]Countries with the highest ASD: Ecuador, 29.6%; Guatemala, 24.8%; Peru, 24.6%; Lebanon, 24.1%; and Chile, 23.8 (GEM, 2017/2018).

[3] Countries with lowest ASD: Bulgaria, 3.7%; France, 3.9%; Bosnia and Herzegovina, 4%; Italy, 4.3%; and Japan, 4.7% (GEM 2017/2018).

articulation between them in the promotion, support, creation and growth of these new companies (SIMATUPANG et al., 2015).

Based on this idea, this article addresses the components that make up entrepreneurial ecosystems, the relationships between them and how they can influence the creation of new companies, and also how different configurations of these components produce results with specificities and characteristics.

In methodological terms, we will adopt an integrated approach to entrepreneurial ecosystems where we are interested in analyzing not only the entities present and participating in the process, but also the relationships they establish with each other. In this perspective, we will try to highlight the complex interconnections between a variety of participants in the entrepreneurial process (eg entrepreneurs, companies, financiers, incubators and accelerators, higher education institutions, government agencies) and the importance of the incentives that the different actors encounter and that impel them to create new organizations and to contribute to the creation of an increasingly favorable environment for entrepreneurship.

For this, we will resort to the case study, contrasting two local ecosystems, Coimbra, strongly influenced by the presence of the university and a mature incubator with several years of activity (IPN - Pedro Nunes Institute) and Sines, dominated by the density of the business fabric , specially shaped by companies and other large entities and a still recent incubator (Sines Tecnopolo).

The article is organized into eight points. After the introduction, in the second point we will describe the relationship between entrepreneurship and entrepreneurial ecosystems, the way studies of these phenomena evolved from approaches focused on one or a few determinants to integrated and comprehensive studies that try to explain the creation of new companies and the dynamics associated with it. In the third point, we will advance to the characterization of entrepreneurial ecosystems, combining the perspectives of several authors. In the fourth point, we try to understand the role of Higher Education Institutions (HEIs) and incubators in boosting the ecosystems of the regions where they are located. In the fifth point, we describe the methodology used. In the sixth point the case studies will be described, in the seventh point the cases will be discussed and,

2 - ENTREPRENEURSHIP AND ENTREPRENEURIAL ECOSYSTEMS

The literature review shows us that most studies in the area of entrepreneurship have focused their concerns on the importance of entrepreneurs for economic development and on the

individual characteristics that are important for the success of entrepreneurship. Contextual factors have also received some attention, but to a lesser extent (ZAHRA et al., 2014). However, few studies have analyzed entrepreneurship from a truly systemic and interdisciplinary perspective, as stated by ACS et al. (2014) andQIAN et al.,(2013). These authors criticize the lack of a holistic approach to the entrepreneurial process that focuses on interrelated aspects of entrepreneurship. This does not mean that the link between networks and entrepreneurship has not been investigated over the past few years, as demonstrated, for example, by the works of HOANG and ANTONCIC (2003), O'DONNELL et al., (2001) and THORNTON and FLYNN (2003). However, there is agreement that the study of the systemic nature of entrepreneurial activity is still in an underdeveloped phase (ACS et al., 2014; GUSTAFSSON & AUTIO, 2011; QIAN et al., 2013).

We intend to underline, therefore, that most of the previous works have devalued the role of the context, considering, for example, the place where the enterprise is born and an exogenous variable develops, when its influence on all aspects of the entrepreneurial process is recognized. In the same vein, it is important to understand that a context associated with a given location is not only the result of certain entrepreneurial practices, it also reflects a much more complex influence on entrepreneurship (JOHANNISSON, 2011). As stated by STAM (2015), it becomes necessary to counter a bias in reasoning that, due to its simplicity, is seductive, but which is quite tautological: entrepreneurial ecosystems are systems that produce successful entrepreneurship and, where there is a lot of successful entrepreneurship , apparently there is a good entrepreneurial ecosystem. Such reasoning, in the final analysis, provides only long lists of relevant factors without clear cause and effect reasoning or an explanation of their coherence or interdependent effects on entrepreneurship.

In this perspective, several researchers have pointed to the need to shift the focus from the characteristics and behaviors of individuals or companies created (SHANE, 2003; SHANE & VENKATARAMAN, 2000) to entrepreneurial realities in broader contexts, such as their configurations regional, temporal and social (AUTIO et al., 2014; VAN DE VEN, 1993; ZAHRA & WRIGHT, 2011; ZAHRA et al. 2014).

It means that, recognizing the central role of entrepreneurship in fostering economic growth, it can be facilitated with well-developed and coordinated entrepreneurial ecosystems (ISENBERG, 2010). It is a construct that has attracted a lot of attention in recent decades, but for which there is still no consensus on its definition, nor an analytical framework that makes explicit both the causes and the consequences.

The OECD (2013) suggests that the concept of entrepreneurial ecosystem is holistic and interactive in nature, stating that it has as background concepts such as regional agglomeration (FUJITA, & THISSE, 2002), innovative regional agglomerations (SAXENIAN, 1994), industrial agglomerations (FELDMAN et al., 2005; PORTER, 1990) and national innovation systems (LUNDVALL, 1992), which have been shaping local economic development policies. The term entrepreneurial ecosystem was initially used by PRAHALAD (2005) and COHEN (2006) to describe conditions in which the individual, companies, governments, civil society and other partners come together regionally to support business activities, with the aim of generating economic wealth and prosperity.

MASON and BROWN (2013), in an article written at the invitation of the OECD, define EE as "a set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (eg companies, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial agencies) and business processes (eg high-growth companies, levels of 'blockbuster entrepreneurship', number of serial entrepreneurs, degree of sell-out mentality within companies and levels of entrepreneurial ambition) that formally and informally merge to connect, mediate and govern performance within the local business environment "(p. 5).

STAM and SPIGEL (2017) define EE as "a set of actors and interdependent factors coordinated in order to allow productive entrepreneurship within a given territory" (p. 1)

In a very different way, ISENBERG (2010) refers to the concept of EE as a network of relationships that allows interactions between a wide range of institutional and individual actors, to promote entrepreneurship, innovation and regional economic growth.

Despite the diversity of approaches, a common link between entrepreneurial ecosystems is the certainty that any ecosystem involves several interconnected key elements, which constantly interact and reinforce each other, encompassing several components that need to cooperate to facilitate innovation and growth (FOSTER & SHIMIZU, 2013; STAM, 2015).

In summary, the interdependent and multilevel nature of entrepreneurial ecosystems implies the notion of potentially synergistic effects of their components, including cross-level interactions (ISENBERG, 2011; SPIGEL, 2015). As VAN de VEN (1993) suggests, entrepreneurship tends to flourish in ecosystems where multiple stakeholders play essential synergistic roles, which usually requires close collaboration of multiple actors and a formal and informal exchange of information in order to carry out activities and allow coordination of activities between the various stakeholders.

After analyzing the concepts and the relationship between entrepreneurship and entrepreneurial ecosystems, we will explore the characteristics associated with entrepreneurial ecosystems.

3 - CHARACTERIZATION OF ENTREPRENEURIAL ECOSYSTEMS - AN INTEGRATED APPROACH

According to MALECKI (2018) ecosystems represent the presence of multiple attributes and overlapping institutions that stimulate entrepreneurial activity and provide critical resources that new ventures can use as they expand and evolve.

The combinations of the elements that make up entrepreneurial ecosystems are very varied and depend on multiple factors, giving rise to very different configurations (MALECKI, 2018). They can be developed around a university of reference or together with large companies, an industry, the density of small and medium-sized companies linked to an economic activity, etc., as illustrated in the study by SPIGEL (2015) on the entrepreneurial ecosystems of Waterloo and Calgary, two Canadian cities.

SPIGEL (2015) refers that the different perspectives on EE emphasize three main regional resources that contribute to the increase of entrepreneurship and growth. First, cultural understandings and shared institutional environments that facilitate cooperation between companies and develop practices such as knowledge sharing and mobility between companies (GERTLER, 2003; HENRY & PINCH, 2001). Second, social networks within regions that create mechanisms for knowledge spillovers between companies and universities (OWEN-SMITH & POWELL, 2004) and that link entrepreneurs to financiers (POWELL et al., 2002). Finally, government policies and universities that can support the formation of an entrepreneurial and network culture, removing institutional barriers,

There is, therefore, some consensus among the different authors as to the components necessary for EE to develop. However, as already stated, one of the most prevalent characteristics of ecosystems is that their attributes do not exist in isolation, but develop together, helping to influence and reproduce each other.

In summary, despite some disagreements regarding the concept and characteristics of entrepreneurial ecosystems, there is a strong consensus on the need to adapt their attributes to local / regional realities.

In the present study we will focus not only on the results, but also on the attributes of the ecosystems located in Coimbra and Sines and the ways in which these attributes interact and reproduce those same ecosystems.

4 - HEI AND INCUBATORS IN ENTREPRENEURIAL ECOSYSTEMS

4.1 - THE ROLE OF HEI

The process of commercialization of knowledge by the HEI has undergone profound changes in the last decades (DEBACKERE & VEUGELERS, 2005).

Indeed, Higher Education Institutions (HEIs) have come to be recognized as relevant economic actors, facing a growing set of requirements, having to articulate, in their development strategies, the utilitarian content of their activity in parallel with the their traditional functions of producing and transmitting knowledge through research and teaching (CARLSSON et al., 2009).

However, the relationship between knowledge production and its conversion into economic and social value is not linear, nor automatic, nor easy to manage and stimulate, with different levels of effectiveness being recorded between countries and regions (EUROPEAN COMMISSION, 2004;WRIGHT et al.,2007). It means that, since the production of high quality knowledge is a necessary condition, it does not seem to be sufficient for its transformation into an economic value to take place. It is crucial to have mechanisms for converting this knowledge.

One of the most efficient and effective mechanisms for converting knowledge produced in HEIs to the market is the creation of spin-offs. The studies that have emerged (still scarce) on the effectiveness of this mechanism, have led HEIs to increasingly seek their integration in entrepreneurial ecosystems that facilitate the creation of companies from the knowledge generated by their structuresinternal (LOCKETT et al.,2005; FRANZONI & LISSONI, 2006).

However, it appears that entrepreneurial ecosystems are not born randomly anywhere. According to MOTOYAMA and KNOWLTON (2017), HEIs are often dynamic elements in EE even when they are considered just another partner and not the central element of the ecosystem. HEIs can feed the ecosystem with qualified human resources, specialized technological knowledge and innovative ideas resulting from academic research. And these are essential ingredients for the production of opportunity entrepreneurship with a strong link to innovation and economic growth.

Some of the most prestigious and visible ecosystems worldwide have as one of the founding pillars the presence of one or more reference HEIs. In fact, HEIs are perhaps the actor / institution most often identified in entrepreneurial ecosystems, as can be confirmed in the works by KINGMA (2014), RICE, et al. (2014), SCHAEFFER & MATT (2016).

Although it is relatively easy to identify several examples of universities, both in the USA and in Europe, that have developed activities considered entrepreneurial and that represent

successful archetypes, such as Stanford University, Massachusetts Institute of Technology (MIT), Universities California, Columbia or Cambridge (DEBACKERE, 2000; ETZKOWITZ et al., 2000; MOWERY et al.,2004; CHIESA & CHIARONI, 2005), the more general reality is that there are still many others in which the entrepreneurial activity is still very incipient and casuistic.

In fact, traditionally, the most important function of HEIs in many places is still to provide highly qualified and specialized talents (BRAMWELL et al.,2008). However, as suggested by RAAGMAA and KEERBERG (2017), some universities act not only as training and research entities, but also as institutional entrepreneurs, integrated in regional, national and international networks, helping to shape development strategies in the regions where they are located. inserted and changing local routines. But building these environments and integrating into networks is neither a quick nor an automatic process.RICE et al.(2014) studied six universities in four countries and concluded that all required a minimum of 20 years to develop a comprehensive portfolio of elements of the entrepreneurial ecosystem.

It is essential to create bonds of trust with other entities that provide complementary services, from financing, to commercial, legal, fiscal support, support to internationalization or management training, which gradually shape and define entrepreneurial networks (FELDMAN & ZOLLER , 2012).

However, in recent years there has been an increasingly effective interest on the part of most HEIs (namely the Portuguese ones) in the creation and maintenance of a transformational and progressive entrepreneurial ecosystem, considered essential to foster, support, develop and commercialize the new knowledge (HALLAM et al., 2017).

The presence of internal intermediary services, such as, for example, support offices for the conversion of knowledge and entrepreneurship are essential in bringing together entrepreneurs and sources of knowledge (HOWELLS, 2006; KIRKELS & DUYSTERS, 2010). O'SHEA et al. (2008) addressed the specific case of MIT, pointing out the presence of these offices as an important factor for the creation of academic spin-offs, but not the only one. Other aspects also proved to be important, such as access to funding for research, the quality and disciplinary basis of the university, entrepreneurship programs, the location of the university, the presence of external support agents, namely venture capital companies and business angels, business tutors, etc., reinforcing the premise that the creation of new companies depends on a stimulating environment formed by a diverse set of support entities.

As previously mentioned, the presence of the essential entities that make up an entrepreneurial ecosystem alone does not guarantee its functioning, nor its development. One of the problems is that these entities, when there is no effective leadership, tend to act in an individual and poorly coordinated manner, neither forming a system nor exploring synergies (NAUWELAERS, 2011; LICHTENSTEIN et al., 2004).

In view of this reality, HEIs that integrate in their institutional strategy the promotion of entrepreneurship and the conversion of knowledge into economic and social value can assume the role of dynamizers of the ecosystem, either through the KTO[4] or offices to support entrepreneurship and the creation of academic spin-offs, either as an active part or as owners of local incubators.

Filling this lack of EE leadership opens a window of opportunity for HEIs, which, if taken advantage of, can lead them to assume a central role, not only as the main players in scientific and technological production, but simultaneously as agents of conversion and transfer of this knowledge for society, articulating its actions with that of other actors that constitute the entrepreneurial ecosystems of the regions where they operate, namely with business incubators, a topic that we will address in the next section.

4.2 - THE ROLE OF INCUBATORS

According to RICE and HABBERSHON (2007), an incubator represents "a context, a system, a structure and a process to improve the beginning, survival, growth and success of the ventures" (p. 19).

Business incubators have been created all over the world as structures to support and stimulate economic activity. Its existence in a given region sometimes acts as a stimulus to the transfer of knowledge that would not otherwise happen, contributing to local or regional economic development (FRITSCH, 2011).

However, incubators vary in terms of the offer and the degree of interaction and synergy they make available to entrepreneurs (FERNANDEZ et al.,2015). Indeed, different consulted studies suggest quite contradictory results with regard to the effectiveness of this type of structures. For example, SIEGEL et al. (2003), in a review of some articles on the effect of science and technology parks (some of which are part of incubators) on the survival and performance of companies concluded that it would be insignificant for the UK context, in line with other authors

[4] KTO - Knowledge Transfer Office - Structures created by HEIs whose mission is to support the transfer and conversion of knowledge produced in HEIs to society.

who carried out studies similar to other contexts (MASSEY et al.,1992; AMIRAHMADI & SAFF, 1993).

Conversely, MEYER (2003) found that the support of incubators to technology-based companies is very important, as a result of the instruments and support mechanisms that they make available to entrepreneurs, namely support in obtaining financing, support for the business plan or consulting support.

too BATHULA et al.(2011) demonstrated that incubation support plays a positive role in the performance of academic spin-offs, as long as they have qualified structures and services, such as shared offices, access to research laboratories, hardware and software, advisory and monitoring services, access to knowledge networks, as well as other start-up companies and local or international companies. This support is intended to provide the new company with a relatively stable environment and an advantage over those that cannot benefit from this support.

BARALDI and HAVENVID (2016), based on an in-depth study of an incubator linked to a University in Sweden (University Karolinska Institute's), consider that incubators, in their evolutionary path, can assume several new roles that incorporate them in global networks as well as in the regional entrepreneurial ecosystem. The authors also consider that incubators should adopt a more strategic perspective, instead of focusing only on the traditional components associated with their operations.

It means, for example, that an incubator can form an entrepreneurial ecosystem based on a university or a dense business context, competently developing its own activities, in order to gain credibility and, simultaneously, leading the interconnection process between the different components of EE , establishing strong ties between the actors, integrating their activity in international networks to access knowledge and non-local capital and deepening networks between members of the ecosystem and other ecosystems to access other resources and, especially, the market (Theodoraki et al ., 2018).

With regard to Portugal, in a study that included eight S&T Parks and seven incubators, RATINHO and HENRIQUES (2010) suggest that the results of the incubators are modest both in terms of the creation of new companies and their subsequent performance, as well as the impact in the regions where they operate. However, some internationally successful cases are recognized, namely the incubator of the Pedro Nunes Institute, with a strong connection to the University of Coimbra, UPTEC, from the University of Porto or Madan Parque, with a strong connection to the Universidade Nova de Lisboa, all with international awards won and which

are the epicenter of local entrepreneurial ecosystems around which all other attributes and components of the respective ecosystems are organized.

In summary, as we have seen, the effects of incubators and science and technology parks on the performance of new companies are not consensual, it seems that they will only have a positive influence when they have qualified and proactive services associated, losing this effectiveness when they are restricted the provision of physical space and administrative support services, or when they have not yet accumulated experience. However, with a strategic vision and well managed, they can assume a central and dynamic role in the entrepreneurial ecosystems in which they operate.

5. METHODOLOGY

The case study is a methodology based on empirical research with mostly qualitative techniques from real contexts, in which multiple sources of evidence are used in an essentially inductive and partially deductive scientific approach (EISENHARDT 1989). YIN (1989), defines the case study as "empirical research that investigates a contemporary phenomenon within its real life context; when the boundaries between the phenomenon and the context are not clearly evident; and in which multiple sources of evidence are used "(p. 23). According to ARIAS (2003), these are common circumstances in the field of business economics.

According to LARRINAGA (2017), this methodology has the same scientific validity as quantitative methods if the required procedures are followed. This author also considers that this method of investigation is especially useful when it is intended to understand a real phenomenon by looking at all relevant variables and when trying to explore or evaluate complex situations or phenomena.

According to the same author, the case study is ideal for research in business management and organization studies that involve processes in which it is necessary to explain complex causal relationships, to deeply understand the real context in which the phenomenon under analysis operates and in which this phenomenon it is complex, ambiguous and uncertain, as is evident in the present study.

According to SPIGEL (2015), the different configurations of ecosystems and their influence on entrepreneurship, as well as their practices and trajectories, can be explored through comparative studies of qualitative case studies. These qualitative methods allow for a differentiated understanding of how entrepreneurs interact with their local entrepreneurial

ecosystem and are particularly useful in situations where there are still few standardized metrics to analyze the structure or success of entrepreneurial ecosystems.

As this is a case study that involves a comparative analysis between two realities, the results should not be considered generalizable, since the ecosystem of each region is the product of its historical, economic and social processes that are, by nature, unique and idiosyncratic. However, the results point to two more generalizable points about entrepreneurial ecosystems: the way in which their structure may differ between regions and the importance of understanding how the connections between their internal attributes help to reproduce the overall structure of the ecosystem and provide benefits to entrepreneurs.

In this article, we chose to compare the cases of IPN, Coimbra and Sinestecnopolo, Sines, as we consider it an adequate way to understand the different configurations of these two ecosystems and the different relationships between their attributes. The objective is not to privilege one type of ecosystem configuration over another, but to illustrate and explore how different types of configurations can influence the results obtained by both incubators.

To characterize the cases, information was collected from a wide variety of secondary sources (public information available on the cases in question, namely news and reports in newspapers, documents and reports available for download on the websites of the entities, as well as other works and presentations made about the organizations in question) and an in-depth interview was conducted with each of the heads of the incubators. Based on a detailed analysis of the information collected, the cases were written and compared between the ecosystems of Coimbra and Sines.

6. CASE STUDIES - IPN AND SINES TECNOPOLO

6.1 IPN Case - Pedro Nunes Institute (Coimbra)

6.1.1 The context

Coimbra is, in the context of Portugal, a medium city, with a population of134 thousand inhabitants and a total of 441 thousand inhabitants in the total of its metropolitan area (Pordata, 2016). It is considered one of the most important cities in Portugal, after Lisbon and Porto, occupying an essential place in the center of the country.. In recent years it has been marked by the stagnation of the number of companies and the decline of the population (6.6% less, in just 15 years)(Pordata, 2016).

However, the city has a set of resources and characteristics considered favorable preconditions for the creation of a knowledge city, namely the secular presence of a University and the marked tertiary character of its economy (about 70% of the city's employment). With regard to

knowledge bases, Coimbra occupies a prominent place among the main university and research centers in Portugal. Indeed, the city has 20 public and private higher education establishments and brings together about 12% of the 1,504 research institutions in the country.

The presence of university students and qualified population in general is an asset for the installation and establishment of companies, not only in the city, but also in the region. It should be noted that in 2016 there were 2,612 teachers in Coimbra and 34,614 students in public and private higher education, that is, 8.7% of the country's total university students (396,268) (PORDATA, 2016). This figure is particularly significant if we consider that only 1.3% of Portugal's total population lives in Coimbra. The ratio between the university population and the resident population in Coimbra is 25.7%, a figure well above the national average, which is only 3.8%.

6.1.2 The Pedro Nunes Institute and the IPN Incubator - From genesis to the present

The Pedro Nunes Institute (IPN) was created on the initiative of the University of Coimbra in 1990, having started its activity in 1991, and hosted the first company in December 1995, the year when the construction of its first two buildings, in which they were installed, was completed. the Materials Testing and Wear Laboratory (IPN LED & MAT); the Computer and Systems Laboratory (IPN LIS); and the Automation and Systems Laboratory (IPN LAS).

In 2002, the IPN Incubadora (building A) was created in order to support IPN companies, in the first years of life, by creating conditions that would facilitate access to the scientific and technological system and an environment that would provide the broaden knowledge in matters such as quality, management, marketing and contact with national and international markets. Having reached maximum capacity quickly, between 2002 and 2007, a new incubation center was built. In 2008, IPN incorporated the Associação Tecnopolo de Coimbra and, in 2010, applied for a new project to QREN, IPN TecBIS - Aceleradora de Empresas. In May 2014, IPN TecBIS, already has two buildings (D and E) with about 4,500 m2 for the installation of companies, starts its activity, becoming the first infrastructure dedicated to scale-ups in the country.

In 2015, IPN takes over the creation and management of ESA BIC - Portugal, incubator of the European Space Agency in Portugal. To this end, it invites UPTEC (Univ. Porto) and DNA Cascais as partners to host companies created through this program in the North and in the Lisbon region, respectively. In 2016, IPN Incubadora assumes, through a protocol with the Municipality of Penela, the management of HIESE - Habitat for Business Innovation in the

Strategic Sectors, an infrastructure of around 500 m2 for incubation and acceleration of innovative companies in a rural environment, about 30 km from Coimbra.

Currently on the IPN campus, in Pole II of the UC of Coimbra, more than 1,000 people work daily (650 in 23 scaleups at Aceleradora, 270 in 40 startups at the Incubator and 120 employees in all IPN units).

Over the years, IPN has established itself as an important catalyst for the region's entrepreneurship and innovation capacity, having received the award for best technology-based incubator in 2010, in the "Best Science Based Incubator" world competition.

6.1.3 The Entrepreneurial Ecosystem Coimbra

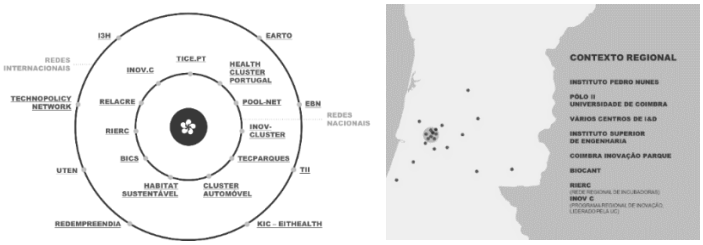
IPN, as an association with more than 40 institutional and business members, is linked to several public and private entities, particularly the University of Coimbra, which was the main promoter of its creation and is the key entity in its management. This umbilical relationship stems formally from its statutes that define the mandatory presidency of the IPN Directorate to be assumed by the UC, and it is also evident in the dimension of human resources. The University of Coimbra and the Polytechnic Institute of Coimbra play a fundamental role in the formation of IPN's human capital, with regard to its internal team, but also to the entrepreneurs it supports.

On the other hand, all its applied R&DT laboratories have a strong connection (through their scientific directors and several researchers) to several basic or fundamental research laboratories at UC, and it is the organization's policy to establish partnership and collaboration relationships in different initiatives and projects with its public and private associates (UC, CM Coimbra, IAPMEI, CGD, Vodafone, The Navigator Company, FLAD, among others).

IPN is a reference actor in the regional, but also national, ecosystem, developing many activities and projects in which it involves partner entities (other incubators, companies, R&D institutions, etc.). In this dimension, it is worth mentioning, for example, the leadership role in RIERC - Network of Business Incubators in the Centro region and the past or present participation in the direction of some Clusters and Competitiveness Poles (Health Cluster Portugal, Inov Cluster).

IPN is integrated into the most relevant national and international networks in the scope of R&D and support for entrepreneurship, as can be seen through the analysis of figure 1.

Figure 1 - The Entrepreneurial ecosystem of Coimbra



Source: IPN (2018)

The entry of new companies in the market is supported by the IPN Incubadora, and the internationalization of already mature companies is done mainly through the IPN TecBIS Aceleradora de Empresas, but also by Laboratories, which invite companies from the Incubator and Aceleradora to participate in international projects, especially from the different European programs (eg H2020, Interreg, POCTEP). In both cases, the capacity for intervention has developed gradually over the years, and IPN and IPN Incubadora now have a group of more than 25 qualified and experienced professionals in the areas of economics, management, marketing, accounting , among others, to support companies in the internationalization process. For the same purpose,

6.1.4 The results of the entrepreneurial dynamics of EE Coimbra

The IPN incubator has already supported the creation / development of more than 300 companies, of which more than 70% are active. These employ around 2,500 people today and represent an annual turnover of more than 160 million euros. Companies like Critical Software or Crioestaminal are successful cases of reference, having been born from IPN's ideas contests. Some of the first ideas contests in Portugal were promoted by IPN with FCTUC (Faculty of Science and Technology of the University of Coimbra) and other national partners and were important in the incubator's first years of operation. Subsequently with the emergence of many other national and international tenders, IPN stopped having its own tender and started to encourage and help companies to compete with those that were appearing in the country (eg Currently, IPN has 35 companies in physical incubation, 86 in virtual incubation, and 112 ex-incubated. The latter generated more than 2,000 highly qualified jobs and generate a turnover of around 80 million euros annually, 35% of which was destined for the foreign market. The survival rate of the incubated companies is 75%, as a result of the model adopted that provides a wide range of services, namely: research and development laboratories, training department, business accelerator, IPN Creative LAB - studio developed to facilitate creativity in the areas of marketing, advertising and communication, a multidisciplinary technical structure with

internal capacity to support startups and spin-offs to grow, and facilitate access to knowledge at the University of Coimbra and, also,

6.2 Sines Tecnopolo case (Sines)

6.2.1 The context

Sines Tecnopolo is located in Sines, although its area of influence, due to the relational character that determines it, goes far beyond the administrative limits of this territory. Even though this is its epicenter, it is important to characterize it, since this reality is decisive in its functioning. The Municipality of Sines has an area of 203.3 km2 and is located on the southwest coast of Portugal, in the district of Setúbal, NUT II Alentejo. According to information from the 2011 Census - INE, 14,238 inhabitants live in the municipality, which translates into a housing density of 70 inhab./km2. Contrary to the demographic trend in Portugal, this territory saw its population increase by 5% between the two census moments (2001 and 2011), which shows its attractiveness, namely due to the dynamics of the labor market.

In Sines, the unemployment rate for the 3rd quarter of 2019 was 6.7% (IEFP, 2018). Equally relevant is the value of the average monthly salary, which is the highest in the country, € 1,791.3, while the national counterpart value is € 1,105.6, information regarding the year 2016 (PORDATA, 2018).

These data about the Municipality of Sines are largely due to the fact that we are facing the main energy and petrochemical center in the country, which, together with the performance of its deep water port, constitutes an engine of development for the country and the region. , and a strong attraction factor for companies, capital and skills.

The business reality of Sines is dominated by large companies such as GALP, EDP, REN, REPSOL and PSA, among others, around which a large number of SMEs gravitate, with a greater incidence in the areas of metallomechanics, instrumentation and industrial control and maintenance, which coexist with these large investments and which in recent years have gained “critical mass”, new customers and, in many cases, new international markets, greatly leveraged by the business dynamics generated by large companies.

Although the business reality of Sines is dominated by logistics, chemistry and petrochemicals and energy, it should be noted that fishing and tourism are activities that also coexist, not always peacefully, with these sectors, contributing to the diversification of the economy.

It was in this industrial context that Sines Tecnopolo, an incubator of technology-based companies, has emerged and has been affirming itself, which, unlike many of its counterparts, dominated by higher education institutions, has been leveraged by this business dynamic.

6.2.2 From genesis to the present

In 2007, the City Council of Sines challenged the Polytechnic Institutes of Beja and Setúbal, and the Universities of Évora and Algarve to create the Vasco da Gama Technological-Based Business Incubation Center Association, an organization dedicated to supporting entrepreneurship , having submitted to the then CSF III a project for the construction of the facilities that would house this project.

In 2008, these founding members were joined by Associação Empresarial de Sines and Leadership Business Consulting, SA; in 2012 ETLA - Escola Tecnológica do Litoral Alentejano and CENFIM - Center for Professional Training in Metallurgy and Metalworking; in 2013 Galp Energia - Sines Refinery; and, in 2014, APS - Administration of Porto de Sines and Algarve, Green World, Lda, Mecwide Sines, SA and Soprofor - training promotion company, Lda, continuing to attract other organizations that contribute to densify each of the EE systems and increase their efficiency.

Constituting itself as a collaboration platform between higher education institutions, other units of the National Scientific-Technological System and companies and other organizations, Sines Tecnopolo's mission is to generate synergies leading to the promotion of entrepreneurship, the qualification of human resources and the transfer of knowledge and technology, in order to empower the people and organizations present in the territory and to increase their attractiveness for investment and the establishment of residents.

Throughout its existence, in addition to the achievement of other goals (which will be explained below), it is worth mentioning the ISO 9001: 2015 certification, by Lloyd's Register, having been the first among its counterparts (incubators, science and technology parks and technopolos) in Portugal to implement a quality management system and obtain its accreditation.

Sines Tecnopolo has established several institutional links of an informal and formal nature, including its membership of the EBN (European Business & Innovation Center Network), a network of 150 centers created by the European Union. It also achieved the status of "BIC" (European Business & Innovation Center), with BIC Alentejo, through which its role in fostering cooperation and synergies between the entities of the scientific-technological system and companies is recognized, in a logic building alliances and partnerships.

In 2018, Sines Tecnopolo joined the Forum Oceano - Association of the Economy of the Sea, which aims to promote the development of the economy of the sea, a decision that aimed to reinforce its specialization as a marine-based technological incubator, to the extent in which the context, geographic and organizational in which it is inserted, the experience it has accumulated throughout its existence, and the need for differentiation, has motivated this distinctive positioning.

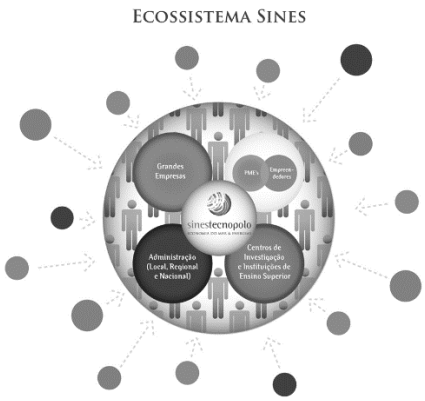
6.2.3 The Sines Entrepreneurial Ecosystem

Sines Tecnopolo, due to its nature and mission, assumes the role of catalyst for an ecosystem made up of higher education institutions and other units of the scientific-technological system, large companies and SMEs, as shown in Figure 2

The interaction between organizations with a different nature, with different types and degrees of knowledge and experience, contributes to increasing the competitiveness of people, organizations and territory. For institutions that conventionally produce knowledge, namely higher education institutions, this will be a means to receive the necessary feedback to adapt their offer and performance to the business reality, to develop applied research and increase the employability of the qualified human resources. For large companies, it will be a way of promoting entrepreneurship in areas where the offer of goods and services does not meet their needs and an opportunity to adapt the profile of their suppliers to their quality requirements. For SMEs it is assumed as a space for access to shared services,

In this context, Sines Tecnopolo constitutes itself as a physical and virtual platform, catalyst of the interaction process, agent of qualification and development of people and organizations, promoting the transfer of knowledge and technology, aiming at the sustainability of the ecosystem that feeds and , consequently, its own sustainability.

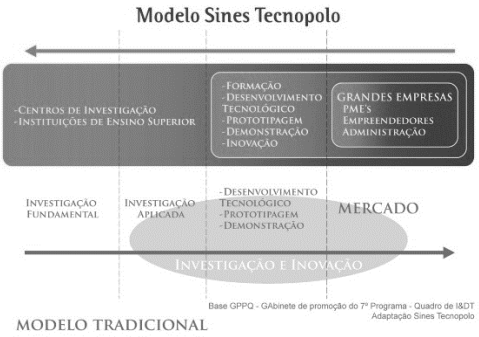
Figure 2 - The Sines Entrepreneur ecosystem



Source: Brito, M. (2013)

With regard to the TS business model, unlike traditional technopolises that focus on a higher education knowledge hub, therefore, starting from the supply side for the market, Sines Tecnopolo, has as its knowledge center the Sines Ecosystem, assuming itself as the dynamizing and accelerating nucleus of business and entrepreneurial activity, starting from here towards the offer of research and innovation (figure 3).

Figure 3 - From the traditional model to the Sines Tecnopolo model



Source: Brito, M. (2013)

6.2.4 The results of the entrepreneurial dynamics of EE Sines

The entrepreneurial dynamics of the Sines Ecosystem can be assessed by the tangible results of the action of Sines Tecnopolo, identified as its core. Its organizational and relational profile materializes in a performance translated into more than 3,000 hours of consulting to entrepreneurs and companies, either individually or in the context of collective projects; 250 supported companies, generating about 400 jobs; and 20,000 hours of training aimed at building profiles of individual and organizational skills, required by the job market and the needs of companies and entrepreneurs in their area of influence.

In 2016, Sines Tecnopolo had physically installed 16 companies, virtually 14 companies, and 8 projects under the Semente Program, a program aimed at supporting entrepreneurs for six months, free of charge, with the objective of maturing and realizing the business idea. .

In addition to these lines of intervention, Sines Tecnopolo has been implementing numerous projects, within the scope of national and international consortia, with the aim of boosting its activity, providing opportunities for companies and entrepreneurs in its ecosystem, and increasing its capital relational, monetizing the intangible investment it has made at this level and also its status as BIC Alentejo (Sines Tecnopolo, 2018). A result whose interpretation has to be contextualized in a territory characterized by a heterogeneous business fabric, in which entrepreneurs, micro-enterprises and SMEs cohabit, gravitate and depend on a small but

dominant number of large national and multinational companies. Perhaps its least successful link is the difficulty in achieving an effective and systematic link between HEIs and the business community, as well as the creation of businesses that are spin-offs of these partners. One of the reasons will certainly be the geographical distance, since any of the HEIs that are part of the Sines EE is more than 120 kilometers away.

7. DISCUSSION

Table 1 shows some of the characteristics and differences between both ecosystems. Right from the start with regard to contextual identity.

Data for the municipalities of Coimbra and Sines		
	Sines (2016) 3	**Coimbra (2016) 3**
Area (Km2)	203.3	319.4
Resident population (nº)	13672	143463
Population density (hab / km2)	67.2	421
Variation of resident population between 2001 and 2016 (%)	0.5	-6.6
Employment rate (%) (1)	53.8	48.5
Unemployment rate (%) (2) (3rd quarter / 2018)	7.2	7
Average salary (€)	1791.3	988
Incorporated Companies	30	439
Dissolved Companies	38	497
Higher education establishments (nº)	1	20
Higher education students (nº)	59	34614
Higher education teachers (nº)	11	2612
Non-financial companies (nº)	1551	19064
Incubator data		
	Sines Tecnopolo3	**Pedro Nunes Institute3**
Age years)	11	25
Consulting (nº hours)	3000	n / a
Supported companies (nº)	250	n / a
Jobs created (nº)	400	2000
Training (nº hours)	20000	n / a
Companies installed in physical incubation (nº in Nov / 18)	24	86
Companies installed in virtual incubation (nº in Nov / 18)	14	35
Ex-incubated companies (nº in Nov / 18)	n / a	112
Turnover of ex-incubators (€ Million / year, Nov / 18)	n / a	160

Table 1: Data for the municipalities of Coimbra and Sines

Source: PORDATA and IEFP, 2018
Legend: n / a - Not available
(1) - Employed population per 100 individuals aged 15 and over
(2) Unemployed population per 100 assets
(3) Data for 2016, except when different year is indicated

Coimbra is a larger population and has a higher population density than Sines. However, while Sines has gained some population, Coimbra has lost 6.6% in the last 15 years. Employment data are similar in both municipalities, although Sines stands out with regard to the average salary, which is 81% higher than in Coimbra. This average wage differential may be one of the reasons for a lower propensity to create companies in Sines. In fact, in Coimbra there was an average value of 3.06 companies created per thousand inhabitants, while in Sines this figure stands at 2.18 (Pordata, 2016). The presence of higher education institutions in both municipalities is the domain where the contrast is most pronounced between the two EE. In Coimbra there are 20 establishments, 34,614 students and 2.

It is noted, therefore, that Coimbra has a strong influence from HEIs, especially from the University of Coimbra, where higher education students represent 24% of the municipality's population and teachers represent 3% of the active population (national average is 0 , 5%); in Sines, on the other hand, large companies in the fields of petrochemicals, energy and logistics prevail, along with the largest deepwater port in the Iberian Peninsula. It should be noted that the four HEIs that make up the associative capital of Sines Tecnopolo, are located more than 120 km from Sines, this being the main justification for the very weak effective participation in the processes of creating new companies in the region, and therefore cannot this, to be considered as relevant assets in the Sines EE.

This reality largely explains the differences in terms of the number and profile of new companies generated within the two EE. In Coimbra, with a more technological profile, more disruptive and more knowledge-intensive, many of them spin-offs from the city's HEIs; in Sines, in less quantity and with a much less knowledge-intensive profile, more oriented either to the final consumer or to the provision of services to the large companies that are prevalent in the municipality.

When we analyze each of the pivots in the construction of the EE, it appears that the IPN, in Coimbra, started its activity 25 years ago, while the Sines Tecnopolo only 11 years ago. This is a relevant indicator, as, as previously mentioned, the construction of EE is hardly a reality before 20 years of operation. In addition to age, the size of physical and human infrastructure is also different. IPN has six R&D laboratories, an incubator and an accelerator.

This age and resource differential allowed IPN to support a group of companies that have already achieved success and public visibility (eg Critical Software; Feedzai; Eneida) that, in addition to representing role models for potential entrepreneurs, some of them also play a role corporate recycling either by supporting new ventures as consultants and tutors, or by providing venture capital to finance new projects (eg Critical Software).

Sines Tecnopolo, being a project still young, is still in the affirmation phase, justifying the differential regarding the number of supported and created companies, the number of jobs created and the national and international networks in which it is inserted. .

In summary, Sines' entrepreneurial ecosystem is driven by the strength of its local petrochemical, energy and logistics industry, a market that creates several niches that entrepreneurs can explore. This has ensured the regular appearance of new entrepreneurs and investors and provides a basis for new companies to develop capabilities and products that can be sold first within the local economy before venturing further. This market attracts highly

qualified workers to the region, although the higher wages offered by the main companies create important challenges to the ecosystem, both in motivation to undertake and in the costs that new companies have to bear in hiring human resources.

In the case of Coimbra, the University and other HEIs have helped to promote networking among the actors of the ecosystem, as a result of the accumulated experience with participation in European R&D projects and cooperation with local entities. At the same time, IPN has highlighted local examples of successful technological projects, contributing not only to increasing the social status of entrepreneurship, but to enhance the effect of business recycling. This status, in parallel with the support of successful entrepreneurs, encourages actors in the region to participate in these networks, helping to create a dense ecosystem for technological entrepreneurship.

8. CONCLUSION

An entrepreneurial ecosystem, like a biological ecosystem, presupposes that its components interact in a harmonious way, always looking for adaptation when the extinction of any of its elements occurs, since the lack or fragility of an element can cause an imbalance and almost always affects other elements of the ecosystem.

In the literature review on entrepreneurial ecosystems, multiple approaches are identified. Although they present different methodological and conceptual perspectives, they share a common belief that certain attributes exist outside the limits of a company, but within a region that contributes to the competitiveness of a new enterprise.

It is also noted that ecosystems represent the presence of multiple components, attributes and institutions that stimulate entrepreneurial activity and provide critical resources that new ventures can use as they grow and evolve.

Ecosystems start from the premise that new companies are not isolated islands, but grow and survive in environments where countless factors can support their development, namely, human capital, financing, support systems and mentors, government structures and education and training, support cultural, leadership, intermediaries, among others.

However, there is no ideal approach to ecosystems that can be generalized, as each ecosystem is unique. Components and interactions within the ecosystem will differ from context to context. This diversity creates the need for a more subtle understanding of entrepreneurial ecosystems that takes into account local specificities.

The cases described show us that the impact of entrepreneurial ecosystems on regional economies depends, essentially, on the interaction that is established between its different actors. An EE is not simply a region with high levels of entrepreneurship, that is, ecosystems are defined by the connections between their constituent parts and the benefits they provide to entrepreneurs. These benefits and relationships may differ between regions. While in the Sines EE, the local petrochemical, energy and logistics market acts as the central point for the development and reproduction of the ecosystem, in Coimbra, the ecosystem lacks a strong and dynamic local market that creates opportunities for new entrepreneurs, having , instead,

This study, like any other, has both methodological and results limitations. First, the main source of primary information was the management structures of Sinestecnopolo and IPN, with no information being collected from companies that had been created with the support of those entities. These, certainly, could enrich and validate some of the information conveyed by the referred entities. Another limitation is related to the inability to generalize results.

Regarding recommendations for future studies, the need to deepen how the structure and influence of ecosystems change over time in response to both external and social economic shocks and internal changes such as, for example, business successes generated within ecosystem or efforts made by organizations created in the region or changing the balance of the business structure.

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