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Institutional entrepreneurship: territorial intervention strategies in the development of low-density cross-border territories through a Triple Helix lens

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Abstract: The objective of this study, from the perspective of Institutional Entrepreneurship (IE), is to understand how territorial intervention strategies (TIS) implemented by Triple Helix agents in low-density cross-border territories, promote the economic and social development. A case study focused on the Science and Technology Brigantia Eco-Park (BE), located in Bragança (Portugal), is proposed. Using a mixed-method approach, 187 anonymous questionnaires were collected from employees of companies and entities based in BE. As results, Institutional Entrepreneurship is positioned as a form of action to promote innovation and territorial development through the implementation of TIS that foster social and economic development. BE stands as the outcome of these agent's actions, presenting results of the impact of this strategy. This study address and explore the theme of IE through the analysis of a case study depicting the actions of entities around a TIS implemented in a low-density cross-border territory.

Keywords: institutional entrepreneurship; TIS; territorial intervention strategies; cross-border territory; Triple Helix.

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1 Introduction

Institutional Entrepreneurship (IE) refers to the actions of individuals and/or organisations seeking to change existing rules, norms, and institutional structures to promote innovation and development. Existing scientific studies indicate that IE also points to a process of change, in this case, institutional, having focused mainly on more advanced Western economies (Battilana et al., 2009; Isenberg, 2010).

Through IE, territorial intervention strategies (TIS) have gained strong expression among policymakers in the European Union (EU), notably as a vehicle for implementing key policies in the Eurozone. The prerequisite for the implementation of these strategies is territorial governance itself, as mentioned in the EU 2020 Strategy, EU 2020 Territorial Agenda, and EU Cohesion Policy (Stead, 2013, 2014).

A TIS is understood as a set of policies, resources, initiatives, and other action measures allocated to improve or address identified weaknesses in territories. The OECD (Lamichhane et al., 2021) defines it as a form of support to meet the ‘Sustainable Development Goals’ (SDGs) and the 2030 Agenda.¹

The European demographic challenge, particularly in low-density and/or rural territories, where the ageing resident population and the exodus of younger populations to major urban centres highlight the clear need for these territories to implement innovative development strategies and policies (Ratinho and Henriques, 2010; Walker and Maltby, 2012). These should stimulate investment attraction, talent retention, and the promotion of entrepreneurship to create employment.

In this context, a group of public and private organisations joined forces to create the Science and Technology Brigantia Eco-Park, an infrastructure located in the Northeast of Portugal, specifically in the low-density cross-border municipality of Bragança, Portugal.

Since 2008, this facility has been owned by a private non-profit Association, the Association for the Development of Brigantia Eco-Park. Its multi-institutional management structure refers to a governance model based on the *Triple Helix* (Etzkowitz and Zhou, 2017), which connects relevant local public agents in a sustainable territorial development strategy. It aims to promote the creation of social and economic wealth, particularly through the creation of qualified (scientific and technological) jobs, and to foster entrepreneurship, thus creating a dynamic of innovation and development of its ecosystem in an increasingly globalised and competitive market.

The objective of this study is to assess, through Institutional Entrepreneurship, the contributions of this collaborative partnership involving local municipalities, higher education institutions (HEIs), and private entities to economic and social development in low-density cross-border territories.

After a brief review of the existing literature on IE, territorial and business context, the study field, more particularly a case study, was presented. Next, the presentation of the methodology applied using a mixed approach, identifying the mode of data collection and how it was processed, notably through the application of questionnaires to employees

of companies based in the Science and Technology Brigantia Eco-Park. After analysing the results obtained through content analysis, various outputs were generated and discussed. Finally, the conclusion was presented, as well as suggestions for future research lines and identified limitations.

2 Theoretical framework

2.1 Institutional entrepreneurship

The concept of Institutional Entrepreneurship (Garud et al., 2007; Hardy and Maguire, 2008; Tracey et al., 2011; Bosma et al., 2018; Onishi et al., 2025) arises to support the emergence of new institutions, representing various activities of agents who share a common interest through specific organisational and/or institutional arrangements, utilising resources to create new institutions or transform existing ones (DiMaggio, 1988; Fligstein, 1997; Rao et al., 2000; Xing et al., 2018). Governments and local authorities are significant institutional actors as they influence entrepreneurial activities within territories (Minniti, 2008; Zahra and Wright, 2011). More specifically, the concept of Institutional Entrepreneurship focuses on the development of these entrepreneurial activities and how these decision-making agents influence their institutional and consequently territorial contexts (Fligstein, 1997; Beckert, 1999; Lawrence, 1999; Aldrich, 2012).

On one hand, we have entrepreneurs who create new business models for the companies they intend to establish (Lumpkin and Dess, 1996), while Institutional Entrepreneurship involves institutional entrepreneurs whose innovative management and organisational models implement and influence the institutional conditions under which others will operate, potentially having significant implications for future entrepreneurs (Haveman, 1993; Aggestam and Wigren-Kristoferson, 2021). However, institutional entrepreneurs are not necessarily traditional entrepreneurs, as launching a new venture is not an essential element of Institutional Entrepreneurship; it can also focus on internal institutional improvement, notably through the concept of intrapreneurship (Kelley et al., 2009; Ordíñana-Bellver et al., 2022).

The contribution of HEIs to territorial change presents several methodological problems in terms of measurement and evaluation, due to the scarcity of empirical studies on what is recognised as a key issue for regional development, particularly from the perspective of the *Triple Helix* (Etzkowitz and Leydesdorff, 1997; Cooke et al., 1998; Morgan, 2007; Etzkowitz and Zhou, 2017).

This study seeks to provide empirical evidence on the practical aspects of academic involvement in the development and construction of a Territorial Intervention Strategy, which, in a case of Institutional Entrepreneurship, culminated in the construction of the Science and Technology Brigantia Eco-Park, located in Bragança (Portugal).

The notions of strategy, governance, and territorial development as holistic instruments supporting territorial management work emerge in the field of European territorial management studies (Stead, 2013, 2014) and have become increasingly common in political discourse within the European Union, particularly when addressing issues of interiority and demography in this type of territory.

In any territorial intervention strategy, the starting point is the diagnosis of the territory we want to intervene in. Specific territorial elements must be considered, based

on the location, such as (hydro)geology, topography, hydrology, coastline morphology, as well as urban development patterns, cultural heritage, and demographic and socio-economic contexts, in addition to regulations and legal framework – works and decision-making practices, to understand the different contexts of the location (Göransson et al., 2021).

Next, it is important to consider, in the specific context of the territory where intervention is intended, the relationship between regional authorities and public or private actors, which is particularly significant in the existing literature on territorial governance (Stead, 2013, 2014). Territorial governance aims to develop concrete strategies and find solutions for specific local and territorial challenges, while advocating an open and inclusive process through policy-making that provides autonomy and responsibility to regional actors (Stead, 2014).

In territorial interventions, the process is usually initiated by a political representative or a public official, led by Local Development Associations (LDAs), and implemented by multidisciplinary teams. However, in some cases, it may be initiated by a representative or member of civil society or the private sector, with the necessary network of contacts (Ashworth et al., 2013; Atay et al., 2023).

It is essential for regional and local authorities to work together with public and private actors in developing and constructing policy that should collectively promote innovative territorial governance. On this basis, regional and local authorities define concrete development strategies in cooperation with economic agents and civil society, mobilising institutions and other stakeholders to implement projects through public-private partnerships, ensuring the coherence and sustainability of various promoted initiatives, while providing a vision and framework for long-term development (Zerbinati and Souitaris, 2005; Council of Europe, 2010; Zannoni, 2024).

2.2 Territorial context

Out of a total of 278 municipalities located in mainland of Portugal, 165 are classified as low-density territories (Jorge et al., 2018), representing 59.3% of the mainland Portuguese territory. Although there is no consensus on the definition of a low-density region, according to Jorge et al. (2018), these territories are distinguished from urban areas in terms of territorial, demographic, settlement, socioeconomic, and accessibility dimensions. They can be defined as: *“a markedly rural territory, climatically severe, with an ageing and declining population, sparse and dispersed settlement, functionally peripheral, with decreasing accessibility to main services and public goods, economically marginal, and dependent on subsistence agriculture and/or public social benefits”*.

In light of the large proportion of low-density territories within Portugal, TIS become important instruments to stimulate the sustainable development of these regions. In recent years, there has been a rejection of the idea of *“forgotten territories”*, and several authors have focused on creating local and regional intervention strategies (Silva, 2010).

The European Union (EU) presents a long-term vision (2040)² for rural areas in the Eurozone, aiming for a stronger, more cohesive, connected, and resilient society with prosperous rural areas. This highlights the importance of the EU's rural areas, which are home to 137 million people, or 30% of the European population, residing in 80% of its territory (EU, 2023).

These low-density population territories are recognised and valued for their agriculture, natural resource provision, and natural and cultural heritage. Regarding

traditions, festivals, and traditional and cultural-based crafts, these aspects are seen as strong tourist attractions, contributing to the development of these territories. This vision is shared by the Organization for Economic Cooperation and Development (OECD), which defines rural regions as those providing a significant contribution to prosperity and well-being (OECD, 2020).

Bragança is a municipality located in the northeast of Portugal, specifically in the Trás-os-Montes and Alto Douro region. It is the capital of the Bragança district and covers an area of 1,173.57 km². In 2021, it had a population of 34,582 inhabitants distributed across 39 parishes and parish unions. According to the National Statistics Institute of Portugal,³ the municipality of Bragança has a population density of 28.6 inhabitants per km². This is a very low value compared to the Portuguese average (110 inhabitants per km²). The Science and Technology Brigantia Eco-Park is located in the city of Bragança (Figure 1).

Figure 1 Study field – Bragança municipality (see online version for colours)



Source: authors

2.3 *Characterisation of the Trás-os-Montes and Alto Douro Science and Technology Park*

The creation of the Trás-os-Montes and Alto Douro Science and Technology Park, with a bipolar structure (Brigantia Eco-Park in Bragança and Régia-Douro Park in Vila Real),

arises from an integrated strategy focused on the specific dynamics of the Bragança and Vila Real territories. It highlights the environment, energy, vineyards, and wine, among other areas, as key sectors for a set of foundational activities, from an energy and environmental sustainability perspective, leveraging the endogenous resources of each sub-region.

The objective of the bipolar structure (Bragança – Vila Real), as reflected in the projected facilities, would facilitate networked work, stimulating the creation of critical mass through the development of projects and activities to counteract the lack of scale and geographic isolation of both cities, which are the capitals of the Trás-os-Montes and Douro regions, respectively.

Régia-Douro Park (Vila Real Science and Technology Park) focuses on the agrifood, agro-industrial, oenology, viticulture, green economy, environmental valorisation, and agri-environmental technologies sectors. Promoted by the Municipality of Vila Real, the University of Trás-os-Montes and Alto Douro (UTAD⁴), and PortusPark – Porto Science and Technology Park Association (APCTP), it aims to serve as a pillar of integrated economic development, leveraging the strong capabilities of UTAD and the region. The park offers multiple support facilities for entrepreneurs and companies, business projects, national and international investors, and promotes research, development, and technology and knowledge transfer. It also includes a Business Incubator-Accelerator, a Business Center (Douro Business Center), a Center of Technological Excellence, and Industrial Plots.

The Brigantia Eco-Park (Bragança Science and Technology Park) fits into the global strategy defined in 2004 by the Municipality of Bragança for its county, addressing the strategic objective of making Bragança a modern eco-city capable of attracting qualified people and investment, leveraging its endogenous resources.

With this purpose, the Bragança Municipality developed, over several years and based on continuous diagnosis and knowledge of the territory, a set of initiatives and projects such as the 2004 study “*Tecnoparque Eco-Energético de Bragança*”,⁵ for the creation, together with other cities of Trás-os-Montes, of the “ecoCITRAS Network – Network of Ecological and Innovative Cities of Trás-os-Montes” and the development of the local “Agenda XXI”. Notable projects include the creation of a “*Center for Research, Innovation, and Business Hosting (CRIBH)*” and the feasibility study of a “*Business Location Area (BLA)*”, which are at the origin of the Brigantia Eco-Park project.

The Brigantia Eco-Park, as part of this preliminary study, has the general objective of promoting a culture of entrepreneurship, innovation and competitiveness in the Bragança Region. Its specific objectives include:

- Providing high-quality infrastructure that offers qualified conditions for the establishment of new (startups) or existing technology-based companies, particularly in sectors and clusters considered strategic.
- Attracting investment projects with value-added activities that require qualified or highly qualified labour.
- Attracting new companies committed to the quality of their products and services, as well as to sustainability and the preservation of natural resources.

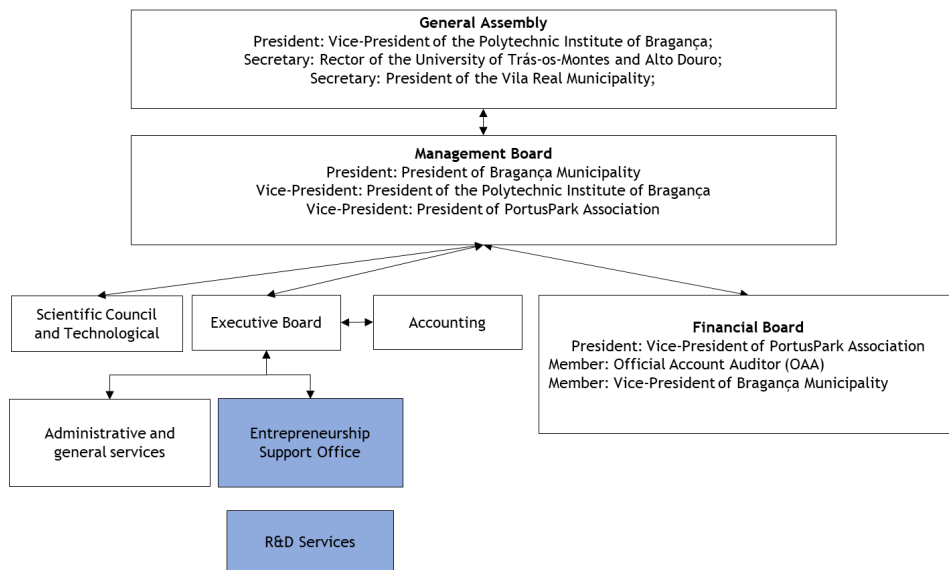
- Developing Research and Development (R&D) projects and providing scientific and technological assistance services.
- Disseminating scientific and technological knowledge, contributing to increased demand and business innovation.

In 2008, the promotion, execution, and management of the Brigantia Eco-Park project became the responsibility of the Brigantia EcoPark Development Association, a private, non-profit association. According to its statutes, it aims to “*contribute to the economic development of the region in which it is located, through the establishment of technology-based companies, research centres, and higher education institutions*”. This association, headquartered in the Bragança municipality, has as founding members four public entities and one private entity, namely: the Municipality of Bragança,⁶ the Polytechnic Institute of Bragança (IPB⁷), the Municipality of Vila Real, the University of Trás-os-Montes and Alto Douro (UTAD), and PortusPark – Porto Science and Technology Park Association.

It is noteworthy that these same entities are also part of the governing bodies of the Régia Douro-Park Development Association (Vila Real), thereby enabling, in the long run, the intended bipolar structure and network, as well as the integration of inter-regional strategies in the development of their activity plans.

Organically, and through an innovative governance model, the association that manages the Science and Technology Brigantia Eco-Park presents the following executive and deliberative management structure (Figure 2):

Figure 2 Organisation structure of the science and technology Brigantia Eco-Park (see online version for colours)



Source: authors

For the development of R&D projects and the provision of scientific and technological assistance services, Brigantia Eco-Park hosted two R&D centres belonging to IPB and UTAD, namely the Mountain Research Center (CIMO) and the Center for Research and

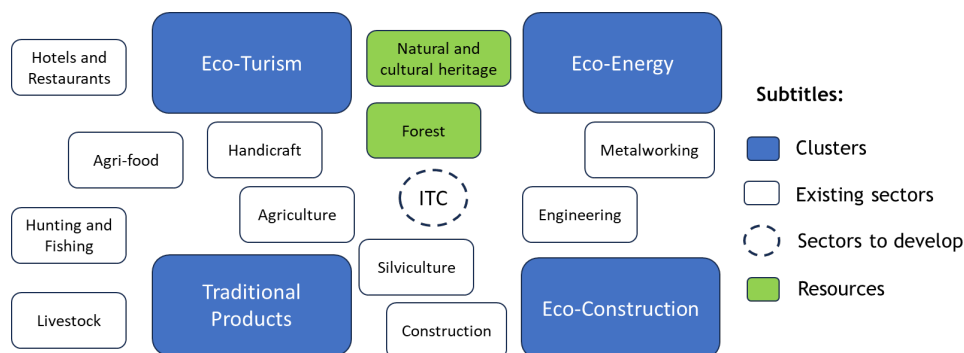
Agri-Environmental and Biological Technologies (CITAB). More recently, in 2018, it also hosted the COLAB MORE Collaborative Laboratory – Mountains of Research.

The region of Trás-os-Montes and Alto Douro, through the European programming period FEDER – European Regional Development Fund (2007–2013), went through challenging times and opportunities to develop its territory economically and socially.

This period boosted the Region of Trás-os-Montes and Alto Douro, taking advantage of its areas of specialisation, namely its productive fabric and the existing university tissue, with emphasis on, in a markedly rural territory, the areas of agricultural, environmental and nature conservation sciences. In the case of Bragança, it is worth highlighting that part of its territory is part of the *Montesinho* Natural Park⁸ and its cross-border proximity to Spain, helping to boost the activities of its strategic sectors and increase the value chain of its endogenous and specific resources.

This vision promoted the development of the Trás-os-Montes and Alto Douro Region, based on the leverage of strategic sectors (Figure 3) of a productive base, in close connection with the areas of specialisation of the regional university, and on the qualification and intensification of excellent products, preserving and valuing their natural and heritage resources, as endogenous and specific resources, and integrating them into the value chain.

Figure 3 Strategic clusters and sectors (see online version for colours)



Source: authors

The renewable energy and energy efficiency sectors are concrete opportunities for the future, based on the creation of wealth from a new productive reality. Faced with the challenge of a new development paradigm, which requires greater academic, scientific and technological capacity in people and companies and a new business culture based on innovation and entrepreneurship, the Bragança Region could not ignore this reality. It therefore adopted a global strategy that consisted of:

- Boosting its endogenous resources and generating increased income and employment;
- Providing a high level of quality of life thanks to a good environment and the establishment of an inclusive and participatory community;
- Promote economic development on the basis of sustained territorial qualification and in the context of inter-municipal action;

- Contribute to the qualification of the comparative advantages of attracting economic activities and investments in its territorial area.

This strategy adopted by the Region essentially involved providing conditions that would make it advantageous to choose its territory, with a focus on territorial and institutional actions, both to facilitate synergies between the economic, business and technological sectors, and to qualify the production model based on technological intensification, innovation and entrepreneurship.

In 2009, an application was submitted for the construction of the Brigantia Eco-Park as part of the then QREN – *Quadro Regional Estratégia Nacional* (2007–2013) and FEDER, with the support of the CCDR-n (*Comissão de Coordenação e Desenvolvimento Regional do Norte*), and construction began on the infrastructure now known as the Science and Technology Brigantia Eco-Park. This structure was opened to the public on 31 August 2015.

It should be noted that the QREN provided Portugal with a framework for implementing a community policy of economic and social cohesion during the 2007–2013 period. The QREN was a strategic goal for the qualification of the Portuguese through the valorisation of knowledge, science, technology and innovation, as well as the promotion of high and sustained levels of economic and socio-cultural development, and territorial qualification, within a framework and perspective of valorising equal opportunities and increasing the efficiency and quality of public institutions.

The FEDER aims to strengthen economic and social cohesion in the European Union by bridging the imbalances between regions and concentrating its investments in several key priority areas, namely innovation and research, a digital agenda, support for small and medium-sized enterprises (SMEs) and a low-carbon economy.

The Brigantia Eco-Park is the product of a territorial intervention strategy, fulfilling the objectives set in 2004 by Bragança City Council. This municipality is now a modern eco-city, capable of attracting qualified people and investment, making the most of its endogenous resources, particularly through the creation of scientific and technological jobs.

In 2018, the Municipality of Bragança sought to provide more agile and specialised support to entrepreneurs and SMEs in its municipality, signing a protocol with Institute for Supporting Small and Medium-sized Enterprises and Innovation (IAPMEI) and the Brigantia Ecopark Development Association, delegating to the latter, through the creation of *Espaço + Empresa*, the provision of services, information and support to entrepreneurs, businessmen's and investors, as well as the creation and installation of a Technological Entrepreneurship Support Office. That same year, Brigantia Eco-Park also joined the Portuguese National Incubator Network (RNI⁹) and signed an agreement with “*Amazon Web Services*”.

In 2019, the Science and Technology Brigantia Eco-Park joined the IASP network (International Association of Science Parks and Areas of Innovation)¹⁰ and the IN3 + innovation network of the National Press *Casa da Moeda*.¹¹ In April 2021, after hosting more than 15 coworkers and in a post-pandemic COVID-19 context, it signed a protocol with the Ministry of Territorial Cohesion and the Ministry of Labour, Solidarity and Social Security of Portugal to integrate Brigantia Eco-Park into the National Network of Coworking Spaces. It should also be noted that since 2018 the Brigantia Eco-Park incubator has been accredited by the public organisation IAPMEI for the Startup-Voucher and Startup-VISA measures. In 2022, it became accredited by IEF¹² (National

Institute of Employment and Training) and Startup Portugal¹³ for the ‘Empreende XXI’ measure.

3 Methodology and data

3.1 Methodological structure

Qualitative and quantitative methods represent methods to ensure the presentation of an adequate sample. Both are attempts to project a finite set of information to a wider population: a population of individuals in the case of the typical quantitative survey or a collection of observations in qualitative analysis (Shaffer and Serlin, 2004). For this case study, a mixed research approach was used (Doyle et al., 2009).

In order to gauge the sociological and professional background of the employees and assess the evolution of the activity of the Science and Technology Brigantia Eco-Park, this research bases its methodological structure on a mixed approach. In the first phase, we defined and built a conceptual model (Figure 3) after a brief overview of the evolution of the case under study (Hamel et al., 1993), developed and applied an anonymous questionnaire to the park’s employees, and collected answers to three open questions posed to the entity that manages the Brigantia Eco-Park.

This study employs a mixed methods approach to comprehensively address the research questions, leveraging the strengths of both qualitative and quantitative data. Qualitative methods were employed to gain in-depth insights into the experiences and perspectives of stakeholders, while quantitative methods provided generalisable data on employment trends and organisational outcomes. This combination allows for a nuanced understanding of the socio-economic impacts of TIS in low-density regions (Doyle et al., 2009).

A triangulation framework was employed to enhance the credibility of the findings by integrating data from multiple sources. For instance, the annual growth rate of incubated companies, derived from quantitative analysis, was compared with qualitative feedback from stakeholders. This convergence of evidence reinforces the validity of the study’s conclusions (Shaffer and Serlin, 2004).

For the case study under analysis, data was collected through 187 anonymous questionnaires collected during the month of January 2024, in addition to the empirical descriptions of the evolution of Brigantia-Ecopark and answers to three questions from the Association’s Board, which contributed to the quality and importance of the data collected:

Question 1 (Q1): Has Brigantia Eco-Park established cooperation agreements with Higher Education Institutions?

Question 2 (Q2): Which cooperation relationship is the most important for Brigantia Eco-Park and why?

Question 3 (Q3): What are the success factors of the cooperative relationship between Brigantia Eco-Park and IPB?

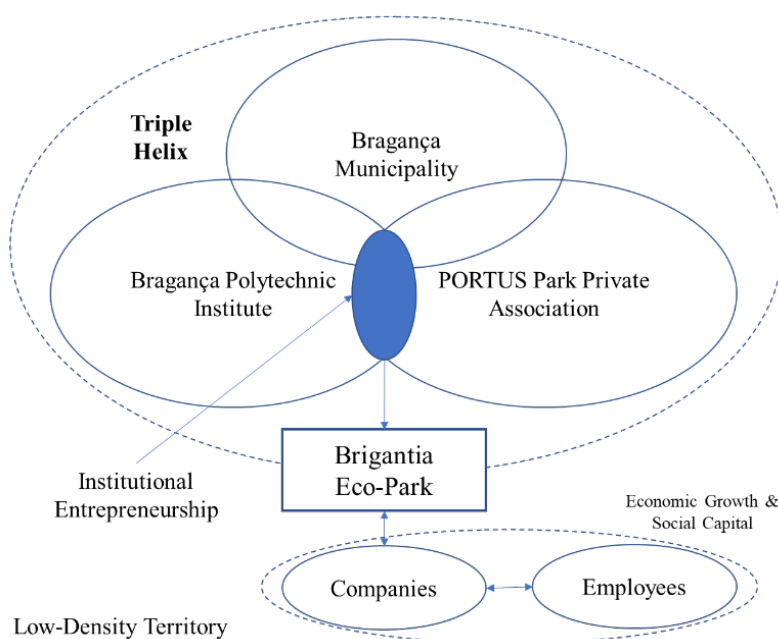
The qualitative data were analysed using thematic analysis, as outlined by Braun and Clarke (2006). This method involved coding responses, identifying recurring themes, and synthesising findings to address the research questions. Key themes included:

collaborative governance, infrastructure as an enabler of innovation and challenges in attracting and retaining talent. The coding process to ensure reliability and consistency was reviewed by three researchers. Qualitative findings were integrated with quantitative data to provide a deep and comprehensive interpretation.

3.2 Conceptual model

Using a perspective and vision based on the Triple Helix model of innovation and development (Etzkowitz and Leydesdorff, 1997), a conceptual model was developed that depicts the interaction of agents around institutional entrepreneurship whose result (Brigantia Eco-Park) contributes to territorial economic and social development (Figure 4).

Figure 4 Conceptual model of institutional entrepreneurship (see online version for colours)



Source: authors

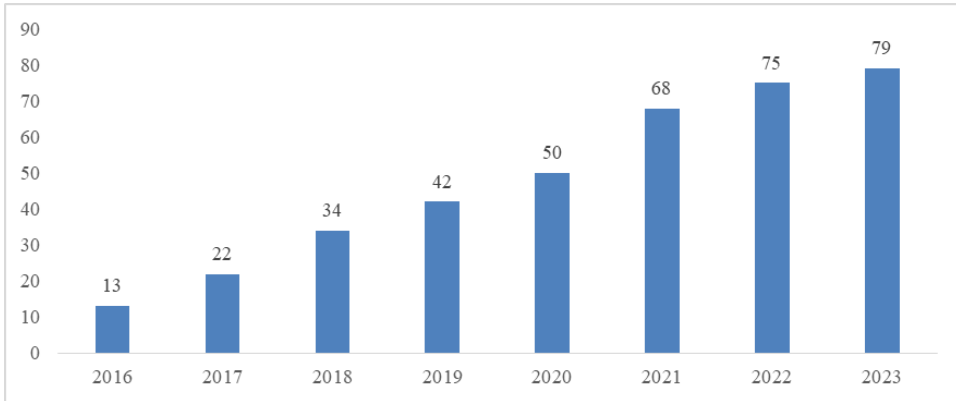
After defining the conceptual model, a structured script was devised for collecting quantitative data, which was transcribed using the Google Forms tool in order to quickly, conveniently and efficiently solicit feedback from the employees of the companies in the Brigantia Eco-Park Science and Technology. Employees received a link to the anonymous questionnaire and were given a deadline for replying. Responses were received between 2nd January 2024 and 5th February 2024.

The data collected was processed and analysed using computer software, specifically Excel.

4 Results analysis

The Board of the *Association for the Development of the Brigantia Ecopark* was asked for information on the evolution of the companies incubated in the park and the employees associated with them. In 2016, the Park ended its first year of activity with 13 incubated companies and the CNCFS¹⁴ (National Competence Centre for Dried Fruit). In 8 years of activity, there has been an average annual growth of 27.25% (Figure 5).

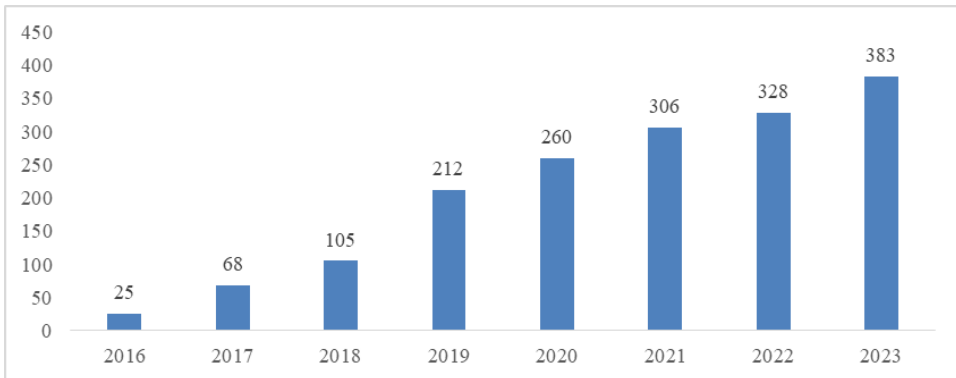
Figure 5 Evolution of companies incubated in Brigantia Eco-Park (see online version for colours)



Source: authors

With regard to the evolution of employees by company, over the eight-year period (2016–2023) there was an average annual growth of 49.08% (Figure 6).

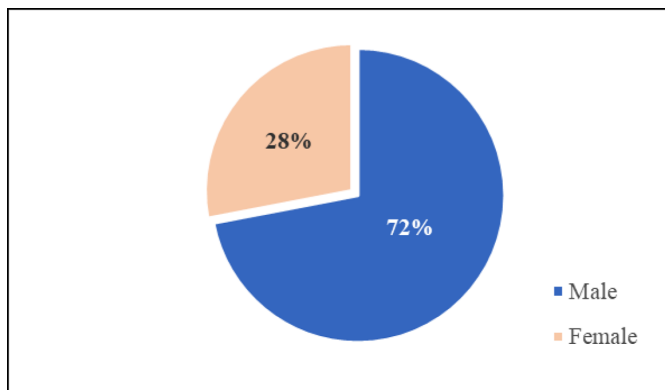
Figure 6 Evolution of employees incubated in Brigantia Eco-Park (see online version for colours)



Source: authors

After collecting and processing the anonymous questionnaires distributed by the Park, the population was 72% male to 28% female (Figure 7).

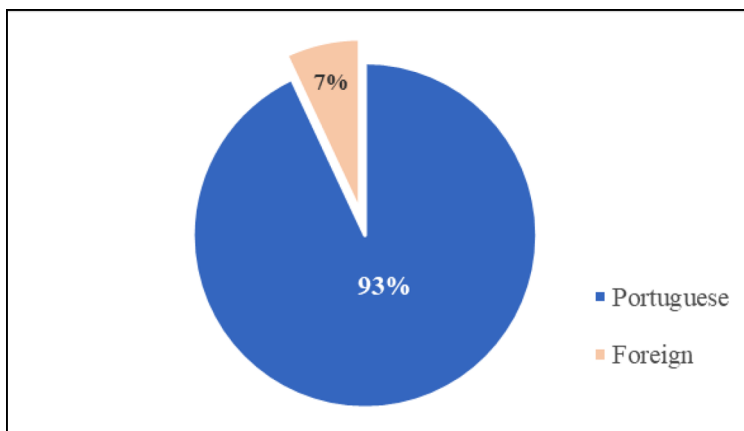
Figure 7 Distribution of Brigantia Eco-Park employees by gender (see online version for colours)



Source: authors

With regard to nationality, 93% of the population surveyed were Portuguese and 7% foreign (Figure 8).

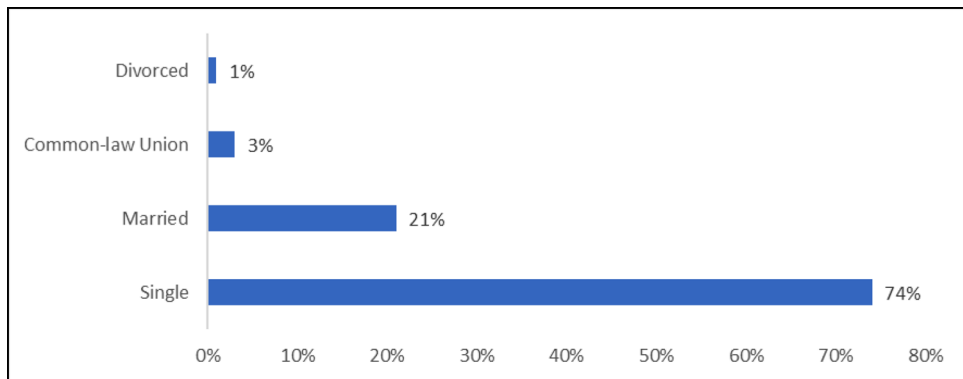
Figure 8 Distribution of Brigantia Eco-Park employees by nationality (see online version for colours)



Source: authors

In terms of marital status, 74% were single, 21% are married, 3% are in a civil partnership and 1% are divorced (Figure 9).

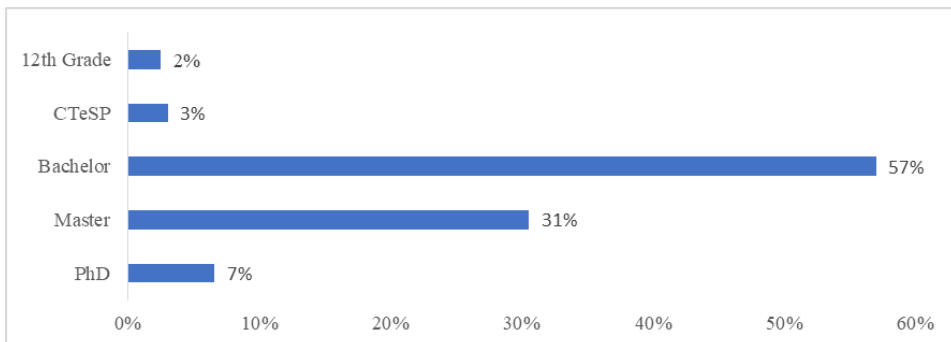
Figure 9 Distribution of Brigantia Eco-Park employees by marital status (see online version for colours)



Source: authors

As far as academic qualifications are concerned, 57% have a Bachelor's degree, 31% a Master's degree, 7% a PhD, 3% a Higher Professional Technical Course (*CTeSP*¹⁵) and 2% a 12th grade degree (Figure 10).

Figure 10 Distribution of Brigantia Eco-Park employees by school grade (see online version for colours)

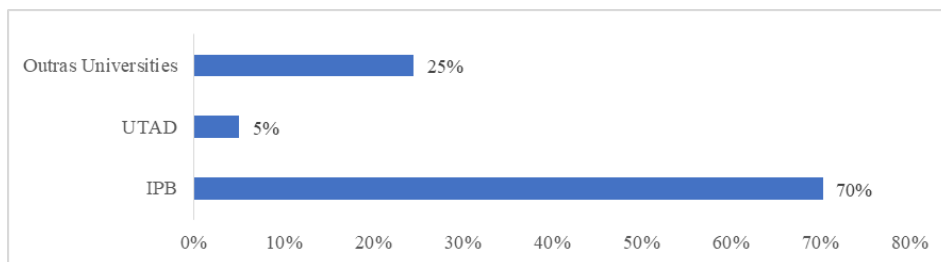


Source: authors

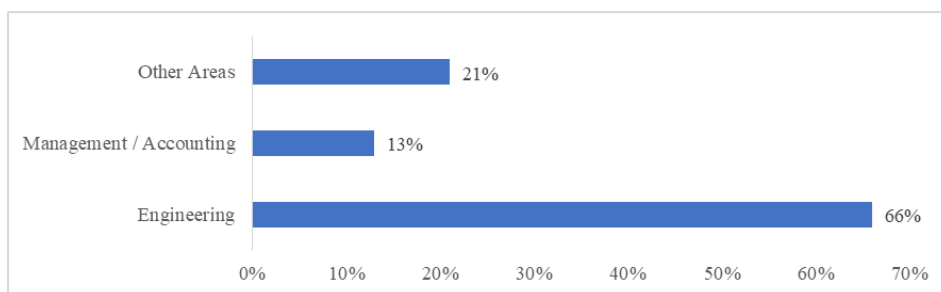
With regard to the link between the employee and HEIs, 70% for the Polytechnic Institute of Bragança and 5% for the University of Trás-os-Montes and Alto-Douro stand out (Figure 11).

With regard to their main academic backgrounds, 66% of the employees associated with the companies in the park are linked to engineering (computer science, electrotechnics, mechanics, environment, etc.) and 13% are linked to management and accounting areas (Figure 12).

The average age of the Park's employees is of 29 years, and 94.21% of human resources are qualified or highly qualified.

Figure 11 Distribution of Brigantia Eco-Park employees by universities (see online version for colours)

Source: authors

Figure 12 Distribution of Brigantia Eco-Park employees by university course area (see online version for colours)

Source: authors

Finally, we directly questioned the President of the Board who, by the status, are also the Mayor of Bragança Municipality, Dr. Hernâni Dias, regarding:

Q1 – Has Brigantia Eco-Park established cooperation agreements with Higher Education Institutions?

“As the Polytechnic Institute of Bragança (IPB) is a member of the Board of Brigantia Eco-Park, there is a natural involvement in terms of cooperation and strategic development of Brigantia Eco-Park’s activity in the Municipality and Region. This involvement extends to the Municipality of Bragança itself, namely through the creation of the entrepreneurship and investment office, together with the protocol signed with IAPMEI for the inclusion of a Espaço Empresa+, added to that office, with the aim of supporting businesspeople and entrepreneurs who want to develop their projects, set up a company on the spot, obtain a particular licence or even specialised advice or mentoring”.

Q2 – Which cooperation relationship is the most important for Brigantia Eco-Park and why?

“All cooperation relationships are important to Brigantia Eco-Park. We are constantly looking to create new partnerships (national and international) and sign new protocols, in accordance with the strategy defined by the Board of the Association, in order to provide a better service and create conditions for greater prosperity for the regional business ecosystem, particularly in areas linked to science and technology, as well as continuing to promote a culture of entrepreneurship”.

Q3 – What are the success factors of the cooperative relationship between Brigantia Eco-Park and IPB?

“In the first instance, the key to the success of the Brigantia Eco-Park comes precisely from the governance model based mainly on strategic cooperation between the Municipality of Bragança and the Polytechnic Institute of Bragança, through the construction and development of projects and activities aimed at promoting entrepreneurship or even the dissemination of technologies linked to the themes of Industry 4.0, scientific and technological entrepreneurship, among many other cooperative partnerships. Secondly, the workers and companies that make up the Brigantia Eco-Park ecosystem are the biggest factor in the success of this institutional entrepreneurship project. Nevertheless, it is still necessary to maintain a constant focus on creating conditions that retain talent, promoting the attraction of new talent, namely through the installation of new research units, consolidated technological companies or technological StartUps, allowing us to continue creating qualified, more attractive jobs with better pay, which is so necessary for the revitalisation of our municipality and the region”.

5 Discussion of results

On 31 December 2023, with an initial investment of around 12.633.390,00€ (Twelve million six hundred and thirty-three thousand and three hundred and ninety euros) and after just over 8 years of activity, Brigantia Eco-Park ended the year with 79 companies based there, the National Competence Centre for Dried Fruit (CNCFS), the MORE – Mountains of Research collaborative laboratory, representing an occupancy rate of 97.24%. Against this backdrop, the companies based in the park total approximately 383 employees.

The ratio of qualified or highly qualified jobs in the park is over 94.21% ($\geq$ Bachelor), 75.42% of which have a direct relationship with the Polytechnic Institute of Bragança (IPB – 70.34%) and the University of Trás-os-Montes and Alto-Douro (UTAD – 5.08%). It is important to emphasise that the turnover of the companies based in the park exceeds 30M€ (Thirty million euros) and more than 7M€ (Seven million euros) relates to the salaries of their employees.

As part of the support provided to businesspeople and entrepreneurs through the integrated service desk – *Espaço Empresa+* (IAPMEI), 206 companies were supported throughout 2023.

Figures 5 and 6 demonstrate the evolution over 8 years of companies and employees at Brigantia Eco-Park. The results obtained confirm the positive trend and impact of the equipment considered with a territorial intervention strategy in the territory (Corsi and Di Bernardino, 2014; Madaleno et al., 2022; Leal et al., 2023).

Another relevant data is the fact that there are more men (72%) than women working in the park, almost in proportion to the percentage of engineering areas (66%) that tend to be more male (Metz, 2007).

With an average age of around 29 years old and a percentage of single people of around 74%, it is understood that the focus on a professional career and the continuous search for improving academic qualifications, particularly at the highest academic levels (Master and PhD), are synonymous of talent retention, personal growth, better financial situation and quality of life (Mantai and Marrone, 2023; Paichadze et al., 2021) or, maybe, seeking conditions to get married (21%) and start a family (Wong, 2023). It is also worth highlighting the percentage of workers with foreign nationality (7%), here also

denoting a factor in retaining and attracting talent from other geographies, highlighting the importance and strong connection to the Regional Higher Education Institution (Huffman and Quigley, 2002; Lawton Smith, 2005), the Polytechnic Institute of Bragança (70%).

In a low density cross-border territory such as Bragança, with strong rural roots, the creation of conditions that favour the attraction and retention of a high qualified young population and the birth of children, are essential factors for mitigating the loss of annually registered population (Korotayev et al., 2023) and sustainable socioeconomic development of the territory (Cadorin et al., 2017; Madureira and Torre, 2019).

Through the interview carried out, it is clear that the success of Brigantia Eco-Park comes primarily from his governance model (*Triple Helix*) based above all on strategic cooperation between the Municipal Council of Bragança, the Polytechnic Institute of Bragança and Portus-Park (Zhou and Wang, 2023), in order to provide a better service and create conditions for the development of the region, particularly in areas linked to science and technology ecosystem, as well as to continue promoting a culture of entrepreneurship (Etzkowitz et al., 2023).

6 Conclusion

This study centres on Institutional Entrepreneurship (IE) by presenting the case study of the Science and Technology Brigantia Eco-Park. This case demonstrates how synergies between public and private institutions can promote economic and social development in sparsely populated cross-border territories (Chamusca, 2024; Rodrigues et al., 2024). It shows that the implementation of TIS, such as the creation of technological infrastructures and/or research centres that promote innovation, combat and mitigate the demographic crisis experienced in this territorial context, as well as contributing to its sustainable and socio-economic development, namely through attracting investment and creating qualified and highly qualified jobs.

The specific case of Brigantia Eco-Park, located in Bragança, proved to be a success story as a result of the collaborative and integrated approach based on the *Triple Helix* governance model. This model favours cooperation between political agents, academics and the private sector in order to create a dynamic and sustainable innovation ecosystem. Setting up R&D + Innovation centres and offering support to SMEs stand out as critical and differentiating factors for economic revitalisation and increasing the region's competitiveness (Etzkowitz, 2002).

The analysis of the results obtained through the questionnaires collected using the methodology applied and the definition of the conceptual model of the case study reinforces the materialised importance of EI as a driver of socio-economic territorial transformation. The outputs presented show that the creation of technology parks in peripheral regions can be an effective strategy for the promotion, sustainable growth and competitiveness of these territories (Etzkowitz et al., 2023).

Analysing the interactions between the various *Triple Helix* agents involved in this research also highlights the importance and impact of collaboration between the Park, the Higher Education Institution (IPB) and the Municipality of Bragança.

The quantitative results obtained show a substantial growth in both the number of incubated companies and the number of employees associated with them. The high qualification of the human resources working in the Park and the importance of strategic

partnerships with the Polytechnic Institute of Bragança in the training of these human resources are particularly noteworthy. The evolution of the Brigantia Eco-Park, reflected in the indicators, points to an increase in the number of incubated companies and, consequently, the annual turnover generated by them, thus illustrating the potential for socio-economic development that an innovation ecosystem can promote (Corsi and Di Berardino, 2014; Madaleno et al., 2022; Leal et al., 2023).

Finally, the present synergy between the various players in the helixes and the emphasis on Institutional Entrepreneurship stand out as key factors for continued success and the Park's ability to attract and retain talent, rejuvenating and boosting the Bragança region, especially the qualified or high qualified talent that comes from the Polytechnic Institute of Bragança (IPB).

With regard to theoretical implications, this study significantly enhances the understanding of Institutional Entrepreneurship (IE) by exploring its application in low-density territories. It extends the concept beyond its traditional focus on advanced economies (Battilana et al., 2009; Isenberg, 2010), demonstrating its adaptability to underdeveloped or peripheral (cross-border) regions. This theoretical expansion provides a foundation for further exploration of IE in diverse contexts.

By applying the Triple Helix model (Etzkowitz and Zhou, 2017) to the development of Brigantia Eco-Park, this research confirms the model's relevance as a theoretical framework for fostering innovation and regional development. It offers valuable insights into how university, industry and government collaborations can address socio-economic challenges in low-density cross-border territories. The study also establishes a theoretical baseline for comparative analysis with other TIS worldwide. By examining the effectiveness of IE in low-density contexts, it encourages broader research into its applicability and outcomes across varying socio-economic and geographic conditions.

With regard to practical implications, the Brigantia Eco-Park case illustrates how TIS can act as catalysts for revitalising economically fragile territories, mitigating demographic challenges such as youth migration and promoting local innovation ecosystems promoting a sustainable regional development (OECD, 2020; Stead, 2013). The findings also emphasise the role of advanced technological infrastructure and strategic partnerships in attracting and retaining highly qualified professionals. This is particularly critical for addressing skill shortages in peripheral regions (Huffman and Quigley, 2002; Madureira and Torre, 2019).

The Triple Helix governance model employed at Brigantia Eco-Park provides a practical and replicable framework for other low-density territories, aiming to foster entrepreneurship, innovation, and sustainable development (Etzkowitz and Leydesdorff, 1997; Zhou and Wang, 2023). Finally, this study aligns with global efforts to achieve the SDGs by demonstrating the impact of targeted intervention strategies in promoting innovation, reducing inequalities, and advancing economic sustainability (Lamichhane et al., 2021).

7 Limitations and future lines of research

The limitations of this study are essentially the scarcity of literature on the subject of institutional entrepreneurship, as well as the fact that it essentially focuses on one case study. It would also be appropriate to extend the study of institutional entrepreneurship to other territorial strategies implemented, such as other Science and Technology Parks or

incubators, particularly in a low population density cross-border territorial context in Portugal or elsewhere in the world, so that they can be monitored and evaluated by researchers in the future, in order to deepen the knowledge and impact of institutional entrepreneurship, and the need for public policies to foster it.

This study is limited by its reliance on descriptive statistics, which provide a foundational understanding but do not fully capture the complex interplay of factors within the ecosystem. Future research should consider employing more advanced statistical techniques, such as Structural Equation Modelling (SEM), to uncover nuanced relationships. Given the limitations of the current dataset and methodological scope, future studies should employ second-generation techniques like SEM to deepen the understanding of causal relationships within the ecosystem.

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Notes

¹United Nations – SDGs 2030 Agenda: <https://sdgs.un.org/2030agenda>

²EU – Rural Vision 2024 – https://rural-vision.europa.eu/rural-vision_en

³Portuguese National Statistics Institute – www.ine.pt

⁴University of Trás-os-Montes and Alto-Douro (UTAD) – www.utad.pt

⁵https://www.cm-braganca.pt/uploads/writer_file/document/2612/2009070917461592788.pdf

⁶Municipality of Bragança – www.cm-braganca.pt

⁷Polytechnic Institute of Bragança (IPB) – www.ipb.pt

⁸Montesinho Natural Park – <https://natural.pt/protected-areas/parque-natural-montesinho>

⁹National Incubator Network 'RNI' – <https://startupportugal.com/rni-portugal-incubators/>

¹⁰IASP Network – <https://www.iasp-pain.org/>

¹¹National Press ‘Casa da Moeda’ – <https://incm.pt>

¹²IEFP – <https://www.iefp.pt/>

¹³Startup Portugal – <https://startupportugal.com/>

¹⁴CNCFS – <http://www.wp.cncfs.pt/>

¹⁵CTeSP – <https://www.dges.gov.pt/pt/faq/cursos-tecnicos-superiores-profissionais-ctesp>