# Reinforcing education for entrepreneurship in higher education institutions: Poliempreende—Polientrepreneurship Innovation Network

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## Abstract

Theme: Strengthening entrepreneurship education in higher education is critical to preparing students for dynamic labor markets and fostering innovation ecosystems. In Portugal, the Polientrepreneurship Innovation Network (PIN), rooted in the Poliempreende program, exemplifies a national initiative to embed entrepreneurial practices across polytechnic institutions.

Objectives: This study aims to understand the institutional conditions that support the reinforcement of entrepreneurship education in Portuguese Higher Education Institutions and to identify opportunities for improving the implementation of the Polientrepreneurship Innovation Network (PIN). It is guided by the research question: *What institutional conditions and strategic factors influence the implementation and development of the PIN, particularly regarding strategic integration, program development, student outcomes, inter-institutional collaboration, and faculty engagement?*

Methods: Drawing on the Triple Helix model and adapting the Framework Conditions Index to the Portuguese context, a qualitative content analysis was conducted on 13 semi-structured interviews with top and middle managers from five polytechnic institutes and two non-integrated schools.

Findings: Four main categories emerged from the analysis: Entry Context, Implementation Conditions, Impact, and Evaluation. These include factors such as strategic embedding, teaching methodologies, institutional interaction, stakeholder engagement, and evaluation practices. Gaps were identified in areas such as promotion, funding, and systematic evaluation.

Implications: The study highlights key enablers and barriers to effective entrepreneurship education, offering strategic insights for strengthening institutional frameworks. Findings support the continued development and potential internationalization of the PIN, positioning it as a critical instrument for sustainable and inclusive entrepreneurial education.

**Keywords:** Entrepreneurship; Entrepreneurship Education; Higher Education; Polientrepreneurship Innovation Network, Innovation Ecosystem.

## 1. Introduction

Entrepreneurship within Higher Education Institutions (HEIs) has garnered significant attention as a catalyst for economic development and innovation. Beyond traditional models, interdisciplinary approaches integrating philosophy and psychology—such as the W.O.M.B. model (Well-being, Open-mindedness, Mindfulness, Brilliance) proposed by de Almeida Leite et al. (2024)—highlight the role of emotional well-being and open-mindedness in fostering creativity within entrepreneurial education ecosystems like PIN. Among the various

stakeholders in an entrepreneurial ecosystem, HEIs play a crucial role in cultivating an entrepreneurial society (Lv et al., 2021; Ranga & Etzkowitz, 2013). They are essential for preparing students to face the challenges of the job market, promoting an entrepreneurial mindset characterized by innovation, adaptability and resilience (Rodriguez & Lieber, 2020).

The integration of entrepreneurship education into HEIs curricula has been shown to positively influence students' entrepreneurial intentions. Exposure to entrepreneurial education enhances students' competencies and intentions to engage in entrepreneurial activities (Lv et al., 2021). This finding underscores the importance of structured entrepreneurial programs in shaping future entrepreneurs.

Rejecting the notion of a genetic basis for entrepreneurial competence—especially considering that, as Turkheimer et al. (2003) argue, competencies are acquired and gene expression is influenced by environmental conditions—several educational institutions, governments, and businesses are increasingly interested in developing synergies and strategies to foster entrepreneurship (Leydesdorff & Etzkowitz, 1996; Redford, 2013).

This study draws from the experiences of multiple stakeholders involved in the Polientrepreneurship Innovation Network to reflect on the critical conditions and strategies needed for entrepreneurship education. Using different models and conceptual frameworks such as the Global Entrepreneurship Monitor, the Triple Helix model, and the Framework Conditions Index, the necessary adaptations have been made to develop a conceptual model more suited to the Portuguese context.

Given the central role of higher education institutions in fostering entrepreneurial ecosystems and the strategic implementation of the Poliempreende Program, this study seeks to answer the following research question:

"What are the institutional conditions and strategic factors that influence the effective implementation and future development of the Polientrepreneurship Innovation Network in Portuguese Higher Education Institutions?".

This study aims to understand the institutional conditions that support the reinforcement of entrepreneurship education in Portuguese Higher Education Institutions and to identify opportunities for improving the implementation of the Polientrepreneurship Innovation Network (PIN). It is guided by a primary research question: *What institutional conditions and strategic factors influence the implementation and future development of the PIN, particularly in terms of its impact on students, faculty, institutional practices, and external stakeholder engagement?* Sub-questions explore how entrepreneurship is integrated into institutional strategies, how teaching methodologies and faculty practices support student development, how external stakeholders contribute to implementation, and how outcomes and challenges are perceived across institutions.

In this context, the main analytical focus lies in understanding how specific institutional dimensions—such as strategic integration, teaching methodologies, stakeholder engagement, and resource management—influence the implementation and development of entrepreneurship education. These thematic dimensions, which emerged from both the literature and the adapted Framework Conditions Index, serve as the core dependent elements analyzed in this study.

To guide this analysis, the study is structured around the following central research question: What institutional conditions and strategic factors influence the implementation and future development of the Polientrepreneurship Innovation Network (PIN) in Portuguese Higher Education Institutions, particularly in terms of:

1. *its strategic integration within institutional governance*.
2. *the development and operationalization of entrepreneurial education programs*.
3. *student learning outcomes and employability preparation*.
4. *inter-institutional knowledge transfer and collaboration*; and
5. *the enhancement of faculty competencies and engagement in entrepreneurship education?*

To frame this analysis, we draw not only on the Triple Helix model (Etzkowitz & Leydesdorff, 2000) but also on the broader concept of the entrepreneurial university. Clark (1998) identified five elements critical to entrepreneurial transformation in HEIs: a strengthened steering core, an expanded development periphery, a diversified funding base, a stimulated academic heartland, and an integrated entrepreneurial culture. Etzkowitz (2003) further developed this perspective by articulating how universities evolve through internal transformation and external engagement. Rothaermel et al. (2007) provided empirical grounding to these frameworks by examining how university structures and networks shape entrepreneurial outcomes. More recently, Iakovleva and Adkins (2023) emphasized the importance of institutional readiness and collaborative cultures for entrepreneurship education. These perspectives inform the analysis of the Polientrepreneurship Innovation Network and its role in transforming Portuguese polytechnic institutions.

## 1.1. Context & Background

### *1.1.1. Entrepreneurship as a Driver of Economic and Social Development*

Entrepreneurship has been the subject of study across various fields of knowledge, allowing for a holistic understanding of the phenomenon today. A conceptual analysis reveals, beyond the dimension of time, diverse perspectives in areas such as psychology, sociology, education, civic engagement, environmental science, technology, and others. Entrepreneurship can be seen as a “kaleidoscope, as there are multiple possible views and combinations” (Portela et al., 2008). For instance, social entrepreneurship is recognized as a significant force in addressing complex social dilemmas and global issues. It moves beyond traditional business models to create innovative solutions that tackle social, racial, and environmental challenges (Antoniuk et al., 2023; Godwin & Crocker-Billingsley, 2024). Social entrepreneurship redefines the entrepreneurial landscape, combining entrepreneurial principles with a commitment to social good, aiming for a positive and equitable impact on society while also achieving financial success. Entrepreneurship is the engine of a nation’s economic, cultural, and social development (Ramalho et al., 2022).

To better understand entrepreneurship, one must begin by examining the individual who drives it—the entrepreneur. The concept originates from the French verb *entreprendre*, which means "to be positioned in the market between the supplier and the consumer" (Brouwer, 2015). From an economic and business standpoint, Schumpeter developed the Theory of Economic Development in 1911, where he referred to entrepreneurs as "wild spirits," responsible for fostering innovation and technological change. According to several authors (e.g., Cunha, 2014), Schumpeter viewed entrepreneurship as the introduction of innovation in a business context, which could manifest as a new product, a new production method, the opening of a new market, the acquisition of a new source of materials, or the establishment of a new firm. Schumpeter linked entrepreneurship closely with the concept of innovation, a perspective that was later reinforced by Drucker (1993). However, contemporary scholars like Leite et al. (2024) critique the “atomistic hero” narrative, proposing instead a “post-individualist” view where entrepreneurship thrives through networks and ‘affects’ (emotions that shape collaboration). This resonates with Portugal’s PIN, where inter-institutional ties and student motivation are central. For Drucker, not all businesses can be deemed entrepreneurial, as some neither create a need nor bring forth new consumers, nor do they undertake risks. In his view, innovation is a specific tool of entrepreneurship that enables entrepreneurs to discover new opportunities. Furthermore, according to Drucker, opportunities can be found in available resources, evolving lifestyles, changes in the organization of time, and socio-economic activities (Drucker, 1993, 2007).

Entrepreneurship is a complex process and dependent on different contingencies and family (e.g., family business), social (e.g., networking), political, and economic contexts. Furthermore, this phenomenon can be understood as the ability to design something innovative with creativity and motivation. In recent years, creating an entrepreneurial activity has become a necessity, on the one hand, especially considering the competitiveness of markets and high unemployment rates. On the other hand, this socio-economic phenomenon generates new jobs and boosts economic growth. Moreover, the entrepreneur is a game-changer and transforms, applies the acquired knowledge and experience, creates value, and, in addition, disseminates this innovative product, often

achieving financial rewards and personal satisfaction. However, the reverse side of the coin brings the confrontation of psychological, financial, and social risks (Mónico et al., 2024).

Within the realm of Social Sciences, there is a particular focus on the individual and contextual components of entrepreneurship. Regarding the individual component, several scholars argue that entrepreneurs are not born but made (Antoniuk et al., 2023; Cunha, 2014; Drucker, 1985; Ferreira, Santos, & Serra, 2010), highlighting the importance of personality traits for understanding entrepreneurial success (Rauch & Frese, 2007). In turn, entrepreneurs are motivated by their environment and the broader business world, striving for the creation, growth, and survival of their enterprises. According to Hisrich, Peters, and Shepherd (2008) and Redford (2013), entrepreneurial ideas are closely linked to goals that the entrepreneur aims to achieve. In a contextual perspective, Ferreira, Santos, and Serra (2010) noted that in less developed countries, entrepreneurial opportunities are often tied to meeting basic unmet needs, such as shelter and food. In contrast, in more developed nations, needs are associated with education, satisfaction, personal fulfillment, entertainment, and social interaction. This highlights a growing societal interest in understanding the concept of entrepreneurship.

According to Baptista et al. (2024), more recently, entrepreneurship is known as a source of expansion, rising and competitive power. It can be described as the recognition and exploitation of opportunities in the business world within the individual and the opportunity nexus, leading to the creation of new business models or just to the consolidation of the ones that already exist (Duman, 2018; Fitz-Koch et al., 2017; Klofsten, 2000; Testas & Moreira, 2014; Wennekers & Thurik, 1999).

For Baptista et al. (2024), the term *business model* has been used to describe an organization business mainly from the supplier's perspective, outlining what the organization is offering and the associated activities with its customers (Priem et al., 2018). In a simpler way, this concept represents the story that aims to explain how an organization works, being interpreted as a design of thoughts on how it generates revenue (Magretta, 2002). Business models can have two main purposes: (1) being a tool to analyze the value creation of an organization; and (2) being a mediator of the transfer of a technology or of an idea to the market, attending to the value created for the potential customers (Carvalho et al., 2019).

The Global Entrepreneurship Monitor (GEM) defines entrepreneurship as "any attempt to create a new business or new venture, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or established businesses" (GEM Portugal, 2013, p. 3). GEM is an independent global entrepreneurship study aimed at analyzing the relationship between the level of entrepreneurship and economic growth, as well as identifying the factors that promote or hinder entrepreneurial dynamics in each participating country (GEM, n.d.).

To comprehend entrepreneurship as a driver of economic and social development, it is essential to consider its variability across different countries. To facilitate the analysis and understanding of cross-country differences, GEM categorized economies into three types based on their economic development characteristics: factor-driven economies, efficiency-driven economies, and innovation-driven economies (Bosma et al., 2009; Bosma & Levie, 2010).

### *1.1.2. Entrepreneurship in Portugal*

Portugal joined the Global Entrepreneurship Monitor (GEM) initiative in 2001 and contributed data until 2015, participating in international comparisons during that period. These earlier reports classified Portugal as an innovation-driven economy, characterized by a strong industrial base, an expanding service sector, and a growing capacity to respond to market demands through entrepreneurship (Bosma et al., 2009; Bosma & Levie, 2010). In such economies, entrepreneurs are seen as "agents of creative destruction," generating innovation and driving structural transformation.

Kelley, Singer, and Herrington (2016) highlighted Portugal's strong performance in entrepreneurial education, particularly at the school and academic levels. At the time, Portugal ranked first in this domain, which may explain

the high levels of entrepreneurial activity among individuals aged 25 to 34, followed by the 35–44 and 45–54 age groups. The country also scored highly in knowledge transfer from R&D (third place) and governmental policy support (second place), reinforcing its position as an emerging entrepreneurial ecosystem.

However, Portugal has not published country-specific GEM reports since 2015. To capture more recent developments, this study draws on updated international sources. The GEM Global Report 2022/2023 identifies key trends in innovation-driven economies, including a growing emphasis on digital transformation, sustainability-driven ventures, and institutional readiness for entrepreneurship (GEM, 2023). In parallel, the European Innovation Scoreboard 2024 classifies Portugal as a "strong innovator", with notable progress in areas such as human capital, business-academia collaboration, and digital infrastructure (European Commission, 2024).

Together, these updated indicators demonstrate Portugal's continued investment in entrepreneurship and innovation, reinforcing the importance of initiatives such as the Polientrepreneurship Innovation Network (PIN) in aligning higher education with national and global innovation agendas.

### *1.1.3. Catalysts for Change: The Role of Higher Education Institutions*

Drucker (1985) argues that entrepreneurship is not a genetic trait but a discipline. Kurato and Hodgetts (2004) further assert that entrepreneurship encompasses models, processes, and case studies that contribute to a comprehensive understanding of the field. Baptista (2016) posits that higher education correlates with increased skills and knowledge, enhancing individuals' likelihood of engaging in entrepreneurial activities (Baptista, 2016; Ferreira, Santos, & Serra, 2010). Education is crucial for fostering entrepreneurship, a key driver of competitiveness and development (Ávila, 2015). To establish entrepreneurship as a socially accepted process, early formative models must be introduced (Parreira, Pereira, & Brito, 2011). Ávila (2015) emphasizes the need for a consolidated entrepreneurial culture within educational institutions. However, initiatives are often sporadic rather than part of a comprehensive strategy, undermining the effectiveness of entrepreneurial academies.

A supportive environment, alongside appropriate incentives, is vital for enabling individuals to learn and develop entrepreneurial behaviors. Education thus serves to transform ideas into reality, equipping youth with the knowledge and skills necessary for active societal integration. Through its various Eurydice reports, the European Commission highlights that the objectives of entrepreneurship education extend beyond business practices, significantly contributing to personal development and life paths (European Commission/EACEA/Eurydice, 2012, 2016). At the higher education level, entrepreneurship education is particularly relevant due to its strong linkage to employability. Sousa (2014) indicates that in Portugal, the transition from graduation to the labor market is complex and unstable, primarily due to misalignment between educational systems and labor market needs.

Higher Education Institutions (HEIs) are pivotal in shaping the entrepreneurial landscape, serving as hubs of knowledge and innovation that can cultivate an entrepreneurial culture and stimulate economic growth. Incorporating entrepreneurship into both curricula and extracurricular activities enhances students' readiness for the workforce.

### *1.1.4. Poliempreende—Polientrepreneurship Innovation Network*

The Poliempreende Program exemplifies the potential of structured entrepreneurship education across Portuguese Higher Education Institutions (HEIs). Its primary goal is to integrate entrepreneurial thinking and practices into various academic disciplines, thus broadening the scope of traditional education.

The Poliempreende Program encompasses almost the entire national polytechnic network and some non-integrated schools, serving as a prime example of cooperation among HEIs. It is built on a rotating coordination system among partner institutions, following a well-defined methodological structure and a specific operational regulation. Within the Polytechnics and Schools, Poliempreende engages at all stages of the entrepreneurial journey, starting with fostering creativity and innovation, supporting the development of business plans, and culminating in company creation through financial awards. The Poliempreende program aims not only to

stimulate entrepreneurship but also to transfer technology, thereby contributing to regional and national development (Parreira, Pereira, & Brito, 2011).

PoliEntrepreneurship Innovation Network (PIN) project was established, serving as a continuation of the Poliempreende initiative. The PIN project aims to assess and analyze the program's potential improvements, ensuring it remains responsive to the evolving economic landscape.

### *1.1.5. The Helix Model in Higher Education*

The Triple Helix Model originated as a framework to understand the dynamic and recursive interactions among universities, industry, and government in fostering innovation. This model asserts that collaboration among these stakeholders enhances innovation and fosters a robust educational ecosystem.

Leydesdorff and Etzkowitz (1996) conceptualized the Triple Helix to address the diverse relationships among these entities. They identified three configurations: (a) the "statist configuration," where government leads but limits innovation; (b) the "laissez-faire configuration," characterized by minimal state intervention, with industry as the primary driver; and (c) the "balanced configuration," which facilitates collaboration among universities, industry, and government, leading to innovative initiatives.

This system includes components (universities, industry, and government), their relationships (collaboration, conflict resolution, networking), and functions occurring within a space of consensus and innovation, known as the "Triple Helix space" (Etzkowitz & Leydesdorff, 2000; Ranga & Etzkowitz, 2013).

In the 2000s, the Triple Helix model evolved into the Quadruple Helix, incorporating civil society as a fourth key actor. This development acknowledged the significance of integrating social and cultural perspectives into the innovation process (Carayannis & Campbell, 2009). For higher education institutions, this shift involved expanding their roles beyond economic demands to address societal challenges and fostering co-creation of solutions in collaboration with citizens and local communities. Initiatives such as living labs and an emphasis on social responsibility and interdisciplinarity exemplify this transformation.

Subsequently, the model further progressed into the Quintuple Helix, which introduced the environmental dimension, emphasizing the alignment of innovation with sustainability goals (Carayannis et al., 2012). Within this framework, universities have increasingly incorporated sustainability and environmental governance into their curricula and research agendas, tackling critical issues such as climate change and the circular economy. Moreover, partnerships with global organizations to achieve the Sustainable Development Goals (SDGs) have reinforced the role of higher education institutions as leaders in green innovation.

In the context of the Poliempreende Program, the Helix model serves as a guiding principle for analyzing how these relationships can be leveraged to improve entrepreneurship education within Portuguese HEIs.

### *1.1.6. The Framework Conditions Index: Structure and Theoretical Support*

In October 2008, at the request of the European Commission, NIRAS Consultants, FORA, and ECON Pöyry jointly published the *Survey of Entrepreneurship Education in Higher Education in Europe*. The study aimed to assess the state of entrepreneurship education in European HEIs, identify best practices, and analyze the barriers and incentives associated with its implementation. Based on interviews with institutional actors from 46 case studies (including two from Portugal), the researchers developed the Framework Conditions Index (FCI**)**—a conceptual model to evaluate the inputs (conditions) and outputs (impact/results) of entrepreneurship education.

The FCI comprises six core dimensions that offer a systemic view of the structural conditions enabling entrepreneurship education within HEIs:

- **Strategy**—how entrepreneurship is embedded in institutional mission, policies, and strategic planning (Clark, 1998; Etzkowitz, 2003).

- **Resources**—how institutions ensure scalability and sustainability, including budget allocation and funding diversification (Guerrero & Urbano, 2012; Rothaermel et al., 2007).
- **Institutional Infrastructure**—presence of support structures such as entrepreneurship offices, research centers, incubators, and interdisciplinary teams (Philpott et al., 2011; Iakovleva & Adkins, 2023).
- **Teaching and Learning**—curricular and extracurricular entrepreneurship education, teaching methodologies, and student-centered learning (Fayolle & Redford, 2014; Nabi et al., 2017).
- **Outreach**—engagement with alumni, businesses, and external stakeholders, and participation in regional innovation ecosystems (Audretsch, 2014; Guerrero et al., 2015).
- **Development**—continuous improvement mechanisms, such as goal evaluation, feedback systems, and staff development (HEInnovate, 2023; Markuerkiaga et al., 2016).

Although the FCI is a useful analytical tool, it has limitations. It tends to prioritize structural and institutional dimensions, while underrepresenting cultural, disciplinary, and relational factors that are central to the Triple Helix and Entrepreneurial University models. Moreover, it does not explicitly account for non-formal learning, inter-institutional dynamics, or context-specific challenges such as academic autonomy or regional disparities in innovation ecosystems.

To address these limitations, the present study adapts the FCI to the Portuguese context and complements it with literature on innovation systems and entrepreneurial universities. The FCI served both as the basis for the interview script and as an analytical framework for coding and interpreting the data, ensuring consistency between theory and empirical analysis.

**Table 1:** Framework Conditions Index**.**

| | | |
|---|---|---|
| Framework Conditions | Strategy | Entrepreneurship goals |
| | | Entrepreneurship policies |
| | | Strategic embeddedness |
| | Resources | Budget allocation |
| | | Income generation |
| | | Type of funding |
| | Inst. Infrastructure | Approaches |
| | | Entrepreneurship appointments |
| | | Entrepreneurship research |
| | | Cross-discipline structures |
| | Teaching & Learning | Courses |
| | | Degrees |
| | | Teaching methods |
| | | Curriculum |
| | | Extra-curricular activities |
| | Outreach | Alumni |
| | | Links with stakeholders |
| | | Community engagement |
| | Development | Evaluation |
| | | User-driven improvement |
| | | HR management & development |

**Source:** (European Commission, 2008).

These dimensions represent structural inputs that HEIs can leverage to become more entrepreneurial. While the framework focuses on fostering entrepreneurship within institutions, it does not encompass broader perspectives, such as the Triple Helix conceptualization of HEIs' role in innovation ecosystems (European Commission, 2008).

### *1.1.7. Research Gaps and Contribution*

Despite the increasing attention given to entrepreneurship education in higher education, significant research gaps remain—particularly regarding **system-level initiatives** that transcend institutional boundaries. Most of the literature focuses on individual case studies, course-level evaluations, or university-centric innovation models, often neglecting the **polytechnic sector** and **inter-institutional cooperation frameworks**.

Moreover, while existing studies discuss entrepreneurial universities (Etzkowitz, 2003; Clark, 1998), few explore how national networks such as the Polientrepreneurship Innovation Network (PIN) operate in practice to foster systemic entrepreneurial capacity. There is limited understanding of how such networks are governed, how they align with institutional strategy, and how they influence faculty engagement, curricular innovation, and knowledge transfer in diverse institutional contexts.

This study addresses these gaps by:

- Analyzing PIN as a multi-institutional case using a theoretically grounded framework (FCI + Triple Helix).
- Focusing on polytechnic and non-university institutions, which remain underrepresented in the literature.
- Exploring the strategic, structural, and pedagogical conditions that facilitate or constrain entrepreneurship education in Portuguese HEIs.
- Proposing an adapted analytical model that can inform both academic research and policy design in similar innovation ecosystems.

### 1.1.8. Theoretical Framework and Conceptual Model

This study draws on two complementary theoretical perspectives to construct a conceptual model linking institutional conditions, networked collaboration, and entrepreneurship education outcomes:

- **The Framework Conditions Index (FCI)**, originally proposed by NIRAS et al. (2008), identifies six core dimensions—Strategy, Resources, Institutional Infrastructure, Teaching and Learning, Outreach, and Development—which reflect the structural conditions enabling entrepreneurship education within HEIs.
- **The Triple Helix Model** (Etzkowitz & Leydesdorff, 2000) situates universities as innovation actors embedded in dynamic relationships with industry and government, emphasizing interdependence, co-creation, and systemic innovation.

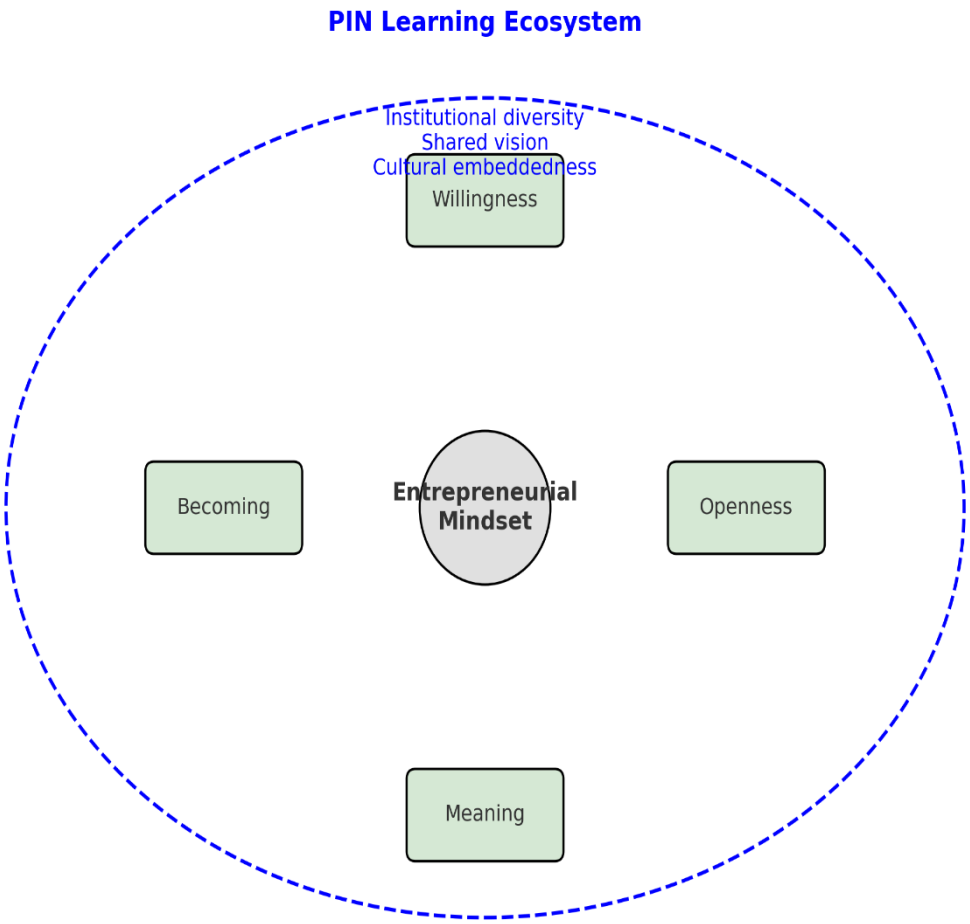
In this study, these frameworks are integrated into a conceptual model that views entrepreneurship education outcomes (e.g., curricular integration, student competencies, faculty engagement, and inter-institutional collaboration) as being shaped by:

1. **Institutional Conditions**—Strategic prioritization, available resources, and organizational infrastructure (FCI dimensions 1–3).
2. **Pedagogical and Outreach Practices**—Teaching strategies and external stakeholder involvement (FCI dimensions 4–5).
3. **Quality and Sustainability Mechanisms**—Evaluation systems, staff development, and continuous improvement processes (FCI dimension 6).
4. **Networked Governance**—The PIN is conceptualized as a mediating structure that enables knowledge sharing, benchmarking, and alignment between institutions.

This model posits that entrepreneurship education outcomes are not solely dependent on internal institutional characteristics but are co-shaped by participation in collaborative networks (like the PIN) and the alignment with national policy agendas.

The conceptual framework is represented in Figure 1, showing the interaction between FCI dimensions, network-level mediation, and targeted outcomes. This framework guided both the interview design and the interpretation of results, ensuring analytical consistency across cases.

**Figure 1:** Symbolic model of the entrepreneurial mindset within the PIN learning ecosystem.




**Source:** Developed by Authors

## 2. Method

### 2.1. Research Design

This study employs a qualitative research design, utilizing semi-structured interviews to explore institutional and strategic factors shaping the implementation of the Polientrepreneurship Innovation Network (PIN). The research was structured around five analytical dimensions that emerged from the literature and conceptual frameworks: (i) strategic integration of entrepreneurship within institutional governance, (ii) development and implementation of entrepreneurship education programs, (iii) student learning outcomes and employability preparation, (iv) inter-institutional knowledge transfer and collaboration, and (v) faculty competencies and engagement. These dimensions guided both the development of the interview protocol and the thematic coding.

### 2.2. Participant Selection

The sample was selected based on relevance and included five Portuguese Polytechnic Higher Education Institutions (Polytechnic Institute of Beja, Polytechnic Institute of Leiria, Polytechnic Institute of Lisbon, Polytechnic Institute of Santarém, Polytechnic Institute of Setúbal) and two non-integrated higher education schools (Higher School of Nursing of Coimbra and Estoril Higher Institute for Tourism and Hotel Studies). These

institutions were selected because they promote and integrate the Poliempreende Program within their structure. From each institution, one "top-level manager" and one "mid-level manager" were interviewed, except for the Polytechnic Institute of Lisbon, which participated only through its "mid-level leader". In total, 13 managers took part in the study.

### 2.3. Data Collection and Analysis

Data were gathered through semi-structured interviews, guided by a predefined script designed to explore various dimensions of the entrepreneurship project—including participation motivations, the evolution of institutional involvement, and perceived impacts at institutional and societal levels. With the consent of all participants, the interviews were audio-recorded, transcribed verbatim, and analyzed using NVivo software.

The interview script and subsequent coding process were structured around the six dimensions of the Framework Conditions Index (Strategy, Resources, Institutional Infrastructure, Teaching and Learning, Outreach, and Development), adapted to the Portuguese higher education context. These dimensions were theoretically grounded in the literature on entrepreneurial universities and innovation ecosystems, ensuring analytical consistency. The coding process also reflected five broader analytical domains outlined in the research design—namely, strategic integration, program development, student outcomes, inter-institutional collaboration, and faculty engagement—allowing for systematic cross-case comparison and thematic interpretation.

In line with qualitative content analysis practices, the frequency of thematic codes was recorded across the 13 interviews. This approach does not aim to produce statistically generalizable findings but rather to provide **indicative patterns** and **support the analytical transparency** of the coding process. Similar procedures are common in qualitative research to highlight the relative prominence of themes, particularly when multiple respondents engage with a structured set of analytical dimensions (e.g., Bengtsson, 2016; Schreier, 2012). Table 4, therefore, should be interpreted as a **descriptive summary of code occurrence** rather than as statistical evidence, consistent with accepted standards in qualitative methodology.

### 2.4. Ethical Considerations

Written informed consent was obtained from all participants, ensuring voluntary participation, confidentiality, and anonymity. All data were securely stored and used solely for academic purposes.

## 3. Results

The results are presented based on categories and subcategories emerging from the content analysis, organized into entry context, implementation conditions, impact, and evaluation.

**Table 2:** Emerging categories and subcategories

| 1. Entry Context | 2. Implementation Conditions | 3. Impact | 4. Evaluation |
|---|---|---|---|
| 1.1. Motivations | 2.1. Interaction Between | 3.1. Students | 4.1 Difficulties and |
| 1.2. Length of | Institutions | 3.2. External | Opportunities |
| Participation | 2.2. Strategy | 3.3. Institution | 4.2 Future |
| | 2.3. Teaching Methodologies | 3.4. Professors | |
| | 2.4. Human Resources | | |
| | 2.5. External Engagement | | |
| | 2.6. Infrastructure | | |
| | 2.7. Resources | | |
| | 2.8. Promotion and Dissemination | | |
| | 2.9. Development | | |

Although primarily qualitative in nature, the data allowed for a basic comparative mapping across the seven participating institutions (see Table X). All institutions reported having implemented entrepreneurship-related curricular offerings, and most had established dedicated support structures, such as entrepreneurship offices or

working groups. While the majority joined the network around the 5th edition of the Poliempreende program (circa 2008), the extent of integration and institutional maturity varied. Some institutions emphasized project professionalization or curriculum integration, while others highlighted student motivation, external partnerships, or faculty development. The presence of incubators ranged from fully operational units to informal or developing structures. The interviews were coded according to Table 3.

**Table 3:** Coding of interviews.

| Interviews | Layering | Code |
|---|---|---|
| A; B; C; D; E; F; G; H; I; J; L; M; N | mid-level manager | .M |
| | top-level manager | .T |

## 3.1. Entry Context

### *3.1.1. Motivations*

Interviewees identified motivation as a key factor in implementing entrepreneurship education strategies. They highlighted four main dimensions: (a) promoting the learning of competencies through formal methods and practical examples (e.g. '(...) they realize that just having ideas isn't enough, they need to consolidate them and they have to learn them and realize that in fact entrepreneurship is multidisciplinary and it's not enough just to have an idea, you have to be able to work on it so that it becomes something objective, the competition is a way of doing that.'(E.T); (b) integrating students into social and professional contexts e (e.g. '(...) there is no society without entrepreneurship, therefore, it is a concept that is installed, because it would necessarily have to be installed, we cannot think of any organization today without thinking of its functional content and its soul, it has to be an entrepreneurial soul (...)' (A.T); 'In terms of employability, even if they go to work for a company they get (...) completely different ideas.' (J.T); (c) addressing societal needs through knowledge transfer (e.g. '(...) overcoming the great problems, the enormous problems, with which the interior of the country is currently confronted (...)' (A.T); '(...) I call the social dimension of higher education intervention in the community, this has a lot to do with what the social role of higher education in the community actually is! One of the strongest aspects is the transfer of knowledge (...)' (A.T); and (d) raising awareness within the academic community about the significance of entrepreneurial education (e.g. '(...) trying to sensitize the academic population to the issue of entrepreneurship.' (M.T); '(...) I was at the beginning of the polyempreende programme and obviously the school immediately recognized the immense advantages of it to speed up its internal development process and formalize it further.' (C.T). According to the answers given, we can see that motivation to join Poliempreende can come from both professors and students (e.g. 'We've had the idea here at school for a long time, particularly a group of professors (...)' (C.T)'It started with a challenge from some students about 7 or 8 years ago, to find out if there was a possibility of (...) a final course work (...) through a business plan and if I could teach them how to build a business plan.' (F.M)).

### *3.1.2. Length of Participation*

The duration of the institutes' participation varies according to the year in which they began their collaboration with Poliempreende. Having been integrated into the project progressively, the records point to an increase in participation in the 5$^{th}$ edition (e.g. '(...) I think it was the 5$^{th}$ or 6$^{th}$ polyempreende at national level.' (D.M), 'It wasn't the first one because we hadn't been challenged yet. but, if I'm not mistaken, it was in the second, when Castelo Branco was still coordinating.' (C.T), '(...) at the time we were invited (...) at most I think there were 6/7 polytechnics' (B.I), 'We joined in the 5th edition, which was in 2008 (...)' (H.M), 'I think we've been involved since the 5th edition (...)' (G.T), 'We started Poliempreende in 2008.' (N.I)).

## 3.2. Implementation Conditions

### *3.2.1. Interaction Between Institutions*

The interviews revealed significant interaction among HEI, characterized by information sharing and experience exchange. This collaborative approach fosters the identification of best practices and promotes continuous improvement of methodologies (e.g. 'And we'll see, and our mates will say 'here it went better, there it went

worse'. And the very fact that we have access to this information makes it possible for us, we can then bring back or validate what we're doing or improve it. It's very much that way, in terms of a learning space in relation to what national coordination is, and the national coordination meetings themselves, I think they're essential. I think that without this Poliempreende wouldn't be what it is.' (N.M)). The interviewees regarded inter-institutional collaboration as a differentiating factor, enhancing institutional development and aligning with the strategic objectives of the Poliempreende Program (e.g. 'The learning was actually realizing that there are many ways to get to the same destination, so with the interaction we had with the other polytechnics, each one was implementing the project, complying with the regulations and finding very creative ways to put things into practice, and that's the learning that takes place in this kind of interaction.' (M.T)).

### *3.2.2. Strategy*

In the context of the Framework Conditions Index, three subthemes were analyzed: Entrepreneurship Goals, Entrepreneurship Policies, and Degree of Strategic Embeddedness. While interviewees acknowledged entrepreneurship as a strategic priority, only the Polytechnic Institute of Leiria explicitly incorporates it into its institutional mission. Other institutions promote entrepreneurship through the Poliempreende mission and operational frameworks. Participants noted the existence of defined activity plans and objectives, indicating a transition from voluntary initiatives to a more structured approach to entrepreneurship education (e.g. 'I see the evolution as very positive. I would say that this project has become professionalized. And so, what was initially a collection of good wills started to have a sustained organization and of course today it runs more smoothly without the involvement of the managers because everything is coordinated. And so, likely, at the beginning I was more aware of everything that was happening as things needed to be pushed forward, but not today, today it's organized, it's a steamboat. It's perfectly integrated within the organization and within its development.' (C.T). In terms of strategic embeddedness, there is a recognized collaboration between top managers and mid-level management. Leadership values the competencies of management in executing entrepreneurial strategies, while management commits to fostering entrepreneurship within their respective institutions.

### *3.2.3. Teaching Methodologies*

All institutions offer curricular units related to entrepreneurship, including adaptations to specific fields. The curriculum emphasizes the development of soft skills, creativity, marketing, and business planning, all geared towards enhancing employability (e.g. ''In all schools there is training in areas of entrepreneurship, some may not have specific teaching areas for entrepreneurship, but there is constant talk of entrepreneurship, I think this is extremely important.' (J.T)). Teaching methodologies prioritize experiential learning, involving entrepreneurs and business leaders to provide practical insights. These findings align with studies like de Almeida Leite et al. (2024), which show how mindfulness and open-mindedness (core components of W.O.M.B.) enhance experiential learning by helping students bridge ideation and practical solutions—a key goal of PIN. Interactive approaches such as brainstorming sessions, workshops, and company visits are also employed, often complemented by personalized mentoring, extracurricular activities, including entrepreneurship workshops and forums, further promote a culture of innovation and entrepreneurial thinking among students (e.g. 'So the general idea is to bring in some names that are more someone who is closer to the reality of our students, who are usually the majority of participants. The idea is to bring them here to share their experiences and be a source of willingness to do things.' (H.M); 'We have a consultant here who comes to mentoring us for 12 hours, from five until seven/eight, and we have planned one to two times a week. Towards the end of drawing up the business plan to help them in the financial area, which is the most difficult part for us, because we don't have specific training.' (D.M)

### *3.2.4. Human Resources*

The analysis of the human resources involved in the Poliempreende project revealed a diverse group of participants, mainly made up of faculty members with multidisciplinary profiles (e.g. 'This is networking, a contact between professors, technicians, between all the staff, which supports the area of entrepreneurship (...)' (G.T)). Each polytechnic institution coordinates the project with teams of between two and six people. The

involvement of directors and middle management is crucial to the success of the project, as they bring valuable experience and insight. While no specific reward strategies were in place, interviewees emphasized the importance of creating incentives and allocating enough time to manage entrepreneurial activities (e.g. '(...) where, for example, professors have guaranteed time to dedicate to this area.' (D.M);'There are two; the first is the mobilization of teaching colleagues for the cause; on the one hand, it's appealing because it's an interesting and challenging project; on the other hand, whether we like it or not it's going to involve more work for colleagues, it's extra to the curricular units, extra to the work they already have at academic level.' (H.M); 'I think that before we can captivate the students, we always need to captivate the professors.' (N.M)). Faculty members with prior entrepreneurial experience contribute positively to the learning environment and foster an entrepreneurial culture within their institutions (e.g., 'We're lucky enough to have colleagues who are involved in entrepreneurship, they're entrepreneurs by nature and that's how they are in life. And I think that makes all the difference because it means we're teaching by example, living the projects you're involved in with passion helps and 'contaminates' the students in a positive way.' (C.T).

### *3.2.5. External Engagement*

All polytechnic institutions reported substantial engagement with external entities, in line with the outreach component of the Framework Conditions Index. This engagement encompasses collaborations with regional, national, and international partners, including other educational institutions, municipal chambers, and both public and private organizations. Six out of the seven institutions noted the participation of external agents who support entrepreneurship education through sponsorships and direct contributions to the Poliempreende project. External stakeholders, including entrepreneurs and industry representatives, often participate in training events and serve as judges for student projects.

The commitment to community engagement is evident, with institutions providing consulting services through incubators and supporting entrepreneurial initiatives. The interviewees also acknowledged the importance of fostering entrepreneurship in pre-higher education levels, highlighting a comprehensive approach to nurturing entrepreneurial talent.

External engagement is evident in the various interviews: '(...) whenever possible, we collaborate with institutions in the region, both local councils and other non-higher education institutions for information, and we also support people and organizations who are interested in setting up companies, but who end up not applying to Poliempreende, because they are people from outside the institute.' (B.M); 'We have the privilege of having many small and medium-sized companies here in the region that still have a face. We know who the owners are. They are people who have often built their own companies and who have gone through all the difficulties of developing a business, so they have experienced first-hand what this reality is like.' (H.M).

### *3.2.6. Infrastructure*

All participating HEI have dedicated infrastructures to support entrepreneurship education. Interviews and institutional website analysis confirmed the presence of incubators and complementary facilities (e.g. 'IPBeja entrepreneurship.' (B.M), '(...) I created IPBeja business and IPBBeja entrepreneurship here,' (A.T), '(...) the entrepreneurship office' (D.M), '(...) our entrepreneurship group, the entrepreneurship office, which is a formalized structure at the school, saw itself grow from there because I felt that the project would be a permanent challenge.' (C.T), 'This year we're also going to include the academic federation, which has the academic associations of all the IPL schools' (I.M), 'Orbis Innovation is currently within the entrepreneurship and employability support unit' (L.M), '(...) we're launching an incubator' (B.M), 'The incubator is already working informally' (N.M).). Although efforts were made to integrate entrepreneurship into curricula, many participants noted challenges in fostering interdisciplinary engagement among students.

### *3.2.7. Resources*

According to the European Commission (2008), financial sustainability is fundamental for an entrepreneurial higher education institution (HEI). The allocation of funds to entrepreneurship activities was highlighted by

interviewees, indicating a commitment to developing this area. Some institutions generate income through external services provided by incubators. Interviewees emphasized the importance of diverse sources of funding, including external funding through sponsorship and prizes awarded to winning teams in the Poliempreende competition. However, many acknowledged that limited resources pose a significant challenge to the rapid expansion of the programme, highlighting the need for diversified funding strategies to ensure long-term sustainability (e.g. 'It's been sustained growth, maybe we'd like it to be faster but with the limited and scarce resources we have, as everyone has, it's been sustained growth.' (F.M), 'The only thing that I think we haven't yet successfully achieved is precisely in funding. I think there should be more funding for Poliempreende.' (J.M)).

#### *3.2.8. Promotion and Dissemination*

Interviewees discussed various communication strategies for promoting Poliempreende-related activities, such as distributing flyers, posting posters in strategic locations, publishing banners on institutional websites, sending emails, and leveraging social media platforms like Facebook and Twitter. Personal approaches, including classroom presentations by faculty and recommendations, were also noted as effective. Despite these efforts, interviewees perceived that Poliempreende still lacks visibility and national recognition. Some institutions mentioned targeted outreach to alumni as an effective strategy to enhance engagement. This category is based on statements such as: '(...) it's very much through the person-to-person way that they themselves bring to class, that they encourage the students to participate.' (H.M), 'We put up posters at visible points in the school, we publicize it on the website with banners, above all we talk about the prizes.' (E.T), 'It's through the flyers we make; we have a page in the school and then it's through presentations in class.' (D.M), '(...) for the first time we publicized our graduates and two or three ideas came to us' (N.M), 'In national terms I think Poliempreende lacks a lot of projection in terms of communication' (N.I).

#### *3.2.9. Development*

The development category includes two subcategories: Evaluation of Goals and Strategies for Entrepreneurship Education and Improvement from the User Perspective. Regarding the first category, only one relevant transcript was identified: '(...) we don't have, let's say, very objective data to understand that' (F.M). Interviewees reported a lack of objective data to assess the effectiveness of current strategies, noting that informal evaluations of entrepreneurship-related activities by students were generally positive.

### 3.3. Impact

#### *3.3.1. Students*

Middle and top management of the participating polytechnic institutions believe that students become better equipped to face job market challenges by developing diverse skills and competencies. These learnings enhance students' effectiveness in future entrepreneurial endeavors. Interviewees emphasized that with the acquired knowledge, students could participate in external competitions and potentially become successful entrepreneurs or intrapreneurs (e.g. 'Here they gain the so-called soft skills, in practice, they are confronted with these challenges.' (G.T), 'They get completely different notions of the market and marketing, so it will always be an asset' (J.T), 'For the students, I think it also opens them up a lot more; some continue to develop their projects. Even in the research unit, the group I have with me has already developed their prototype and applied for funding. So, I think they somehow get the bug.' (D.M), '(...) I think it adds value to their CVs. It gives them this vision; one day if they need to draw up a business plan, they'll know what to do, how to do it and who to turn to.' (D.M).

Additionally, students can select topics for their master's thesis, which can lead to funded or incubated projects. Throughout their academic journeys, students also learn about real entrepreneurial experiences and have opportunities to visit companies, further bridging the gap between education and practice.

#### *3.3.2. External*

The results of the interviews conducted in this study indicate that regional public institutions and private companies significantly benefit from the support provided by Polytechnic Institutes (IPs) and Schools, particularly

through knowledge transfer. There is also a growing interest from companies and institutions in recruiting qualified human resources trained by the IPs/Schools, who are seen as potential future collaborators. Moreover, the community has access to consulting services through incubators and other entrepreneurial structures affiliated with the institutions. Interviewees highlighted the positive impact of these initiatives on regional development, contributing to the enhancement of the local economic landscape by fostering the creation of new businesses and innovations (e.g. 'We are enriching the economic fabric of the region.' (H.M), '(...) it also gives us the possibility of being able to transfer knowledge to the community, to companies,' (J.T), '(...) or a group of people from the region who ask us for support, we usually help.' (B.M), '(...) because many of these companies also, at the end of the day, when they come to the incubator, ask us for some CVs so that they can then recruit our students.' (B.M)).

#### *3.3.3. Institution*

For the various Polytechnic Institutes (IPs) and Schools participating in our study, the Poliempreende-PIN has accelerated the enhancement of entrepreneurship education, as well as the restructuring of curricular plans that are increasingly aligned with market needs (e.g. '(...) at ESTG we're now integrated, I'd say all the courses except solicitors, have the subject of entrepreneurship.' (B.M), 'Initially, there wasn't as much development as we're doing with Poliempreende.' (J.T); '(...) at least, even students who are finishing recently have asked us to show them the incubator,' (B.M), '(...) we've actually had companies that have been created, probably the type of support we've given our students over the editions has been more effective, more directed towards what they need and we've also managed to make them more effective in terms of the company and the project.' (H.M)). The interviewees believe that students are more interested in becoming entrepreneurs and that there is "probably" greater effectiveness in entrepreneurship education. According to the interviewees, both the quality of projects from each IP/School and the number of companies, job positions, and patents created are becoming increasingly significant. It was also concluded that IPs/Schools gain greater influence in the surrounding community, have a greater impact on the lives of students and faculty, and are witnessing the development of new work networks ( e.g. '(...) which is a greater sensitization of the whole community to the importance of the issue,' (E.T) 'On balance I think it's clearly positive, given the number of young people involved, the number of companies that have already been set up, the whole dynamic. Clearly our students and our institution have become richer because of this event.' (G.T)).

#### *3.3.4. Professors*

The data analysis revealed that professors benefit from integrating entrepreneurship education into their institutions. They could develop new skills and adopt innovative approaches. As entrepreneurship education becomes more widespread, professors recognize its importance and thus develop professionally and personally (e.g. 'I think that for us professors, and for me, it's been a learning experience. Every day we learn, and every year, I think this has been a continuous learning and development of skills in this area.' (D.M), 'Even the professors involved in the project have felt encouraged to embrace other ways of thinking.' (C.T), 'I'd say it's a permanent challenge that we must somehow turn this practice, whether it's formal teaching or non-formal teaching, into something that is effectively very creative, very stimulating, I think this is a permanent challenge that institutions must do. I think this is an ongoing challenge that all of institutions must fulfil.' (G.T), 'we are very committed to preparing students to achieve these good results, the professors also dedicate themselves to giving specific guidance. specific guidance and, as I said, it's an extremely important area in our institute.' (J.T)).

### 3.4. Evaluation

#### *3.4.1. Difficulties and Opportunities:*

The interviewees reported various challenges in entrepreneurship education, including student dropouts due to the overlap of projects with evaluation periods, lack of initiative, risk aversion, and a shortage of technical skills. Students also face difficulties in generating market-applicable ideas, requiring support for project development (e.g. '(...) there are always people interested, but then they give up, and maybe we have to start earlier because then the projects are due on top of the exams.' (B.M), '(...) When we asked for an idea for a business, everyone

wanted to make a roulette to sell puppies. I said, "Hey, you must use your skills, you went to school for three years to sell puppies? Use your intellectual abilities, which you have. You have a hobby; you practice yoga and karate. Go and do a job, but within what you know'. And I come up with everything from a van/bus. to take the drunks home from Lisbon at night, the ideas even come up but they're not ideas for them, I ask 'and what are you going to do? Drive the roulette, fry the steaks?' and they say, "oh no, I don't know how to do any of that, I'll take care of communication", a quarter of an hour a day. So, this notion of doing things is very complicated.' (I.M)). Regarding the faculty, high workload and a lack of human resources were identified as challenges, while faculty training was seen as an opportunity for improvement. Furthermore, the importance of strengthening relationships between the Polytechnic Institutes (IPs) and companies, as well as enhancing the promotion of Poliempreende, was emphasized.

Suggestions included rewarding first-year students and creating a Poliempreende manual to guide participating institutions (e.g. '(...) a kind of manual, a kind of script that each institution had to follow, a kind of pre-content (...) A Poliempreende script that had the structure, the duration, the number of workshops, the evaluation dates... I think that's what was appropriate, it doesn't mean that people follow it afterwards, but there was a script...' (E.T)).

### *3.4.2. Future*

The future is seen by the interviewees as a continuation of the Poliempreende project. Despite the desire to reformulate curricula, invest in areas of community interest and develop students in this regard, there is a belief that the project needs to evolve, grow and become more formalized. The need to foster greater engagement with the business community and develop more partnerships was also identified. Interviewees expressed a strong desire for the project to be internationalized, for example by developing contacts with young people from other countries. Some evidence on this topic has been: 'And who knows, for example an area that is now being developed is social entrepreneurship, which is a very important area, and we have three colleagues who are developing this area, I think it will be around there, because volunteering is very important and developing this area and these skills in students.' (D.M), '(...) I think it's time for the competition to go international, maybe to the PALOP'S, Brazil, Macau...' (F.M), 'The future of entrepreneurship... I think it should develop increasingly. The subject is fundamental to all areas of education. Polyempreende has been a very successful competition and programme, so I think it's worth continuing and even boosting it further' (J.T).

### 3.5. Correlations Between Categories

**Table 4:** Pearson correlation analysis between categories.

| Node A | Node B | Pearson correlation coefficient |
|---|---|---|
| \4 Evaluation\Difficulties & Opportunities | \2 Implement.\Teaching Methodologies | .90008 |
| \3 Impact\Students | \2 Implement.\Teaching Methodologies | .882289 |
| 6D\5 Outreach\Links w stakeholders | \2 Implement.\Teaching Methodologies | .878276 |
| 6D\1 Strategy\Entrepreneurship policies | \2 Implement.\Teaching Methodologies | .874604 |
| \4 Evaluation\Difficulties & Opportunities | \2 Implement.\Promotion & Dissemination | .872571 |
| \4 Evaluation\Difficulties & Opportunities | \3 Impact\Students | .865543 |
| \4 Evaluation\Future | \4 Evaluation\Difficulties & Opportunities | .86193 |
| 6D\6 Development\HR | \4 Evaluation\Difficulties & Opportunities | .856507 |
| \4 Evaluation\Future | \2 Implement.\Teaching Methodologies | .852267 |
| \4 Evaluation\Future | \2 Implement.\Interaction between institutions | .851126 |
| 6D\1 Strategy\Entrepreneurship policies | \4 Evaluation\Difficulties & Opportunities | .84949 |
| \3 Impact\Students | \2 Implement.\External Engagement | .844986 |
| 6D\5 Outreach\Links w stakeholders | \4 Evaluation\Difficulties & Opportunities | .843968 |
| \4 Evaluation\Difficulties & Opportunities | \3 Impact\Professors | .843506 |
| 6D\5 Outreach\Links w stakeholders | \4 Evaluation\Future | .84085 |
| \3 Impact\Students | \1 Entry Context/Motivations | .839745 |

Through NVivo, a Pearson correlation analysis based on word similarity was conducted. From this analysis, we can observe that the categories Impact on Students, Links with Stakeholders, and Entrepreneurship Policies are correlated with the category Methodologies and Teaching, with Pearson correlations of .882289, .878276, and .874604, respectively. The categories most strongly related to Difficulties and Opportunities are Methodologies and Teaching (.90008), Promotion and Dissemination (.872571), Future (.86193), Human Resources (.856507), Entrepreneurship Policies (.84949), Links with Stakeholders (.843968) and Impact on Professors (.843506). Correlated with the category Future, we find the categories Methodologies and Teaching (.852267), Interaction between institutions (.851126), and Links with Stakeholders (.84085). Furthermore, we can see that Impact on Students is correlated with External Engagement (.844986) and Motivations (.839745).

## 4. Discussion

### 4.1. Alignment with Research Questions

This study focuses specifically on public Portuguese Higher Education Institutions participating in the Polientrepreneurship Innovation Network (PIN). As a qualitative study based on semi-structured interviews with a limited number of institutional representatives, it does not aim for statistical generalization but rather for a conceptual and exploratory understanding of systemic dynamics. The scope is limited to institutional conditions and strategies within PIN, and does not include private institutions, international networks, or policy actors external to HEIs.

The findings provide structured and comprehensive answers to the central research question and its five sub-dimensions. They show that the implementation of the Polientrepreneurship Innovation Network (PIN) has been shaped by distinct levels of strategic integration, program development, faculty engagement, inter-institutional collaboration, and student outcomes across Portuguese Higher Education Institutions (HEIs). Crucially, the results reaffirm the role of HEIs as key agents in fostering entrepreneurial mindsets and employability, particularly when supported by committed leadership and institutional networks that facilitate rapid learning.

The research highlights the essential role of leadership in accelerating institutional transformation and the importance of embedding entrepreneurship as a transversal mission. Despite national policy support, only one institution explicitly integrated entrepreneurship into its formal strategic documents, suggesting that cultural and institutional inertia remain significant obstacles.

### 4.2. Convergences and Divergences with the Literature

The results show strong alignment with the literature on entrepreneurial universities and innovation ecosystems (Etzkowitz, 2003; Clark, 1998), especially in how institutional missions and governance influence entrepreneurship education. Institutions more advanced in entrepreneurial education echoed the strategy-structure-environment fit proposed by Guerrero and Urbano (2012).

However, the findings diverge from idealized representations of inter-institutional collaboration often presented in Triple Helix models. While participation in PIN fostered some collaborative initiatives, cooperation remained informal, lacking systemic coordination and common governance tools. Leite et al. (2024) caution that overly rigid networks (‘strong ties’) may stifle innovation by limiting exposure to new ideas. The PIN could thus balance formal governance with Granovetter’s ‘weak ties’ to maintain diversity and adaptability. This echoes Iakovleva and Adkins' (2023) observation that symbolic participation in networks does not guarantee substantive collaboration or innovation diffusion.

Moreover, barriers such as curriculum overload, fragmented communication, and inconsistent teaching methodologies were consistent with critiques of entrepreneurship education in traditional academic environments (Fayolle & Redford, 2014; Nabi et al., 2017).

### 4.3. Emergent Patterns and Critical Interpretation

Three cross-cutting patterns emerged from the data:

1. The centrality of motivated individuals (“champions”) in initiating and sustaining entrepreneurial initiatives, often without formal institutional support.
2. The uneven integration of entrepreneurship into curricula, which ranged from elective courses to mandatory, cross-disciplinary modules.
3. A shared perception that entrepreneurship education enhances students’ employability, particularly through soft skills, adaptability, and project-based learning. Nevertheless, challenges remain. Institutions struggled with inconsistent implementation, a lack of formalized human resource strategies, and the voluntary nature of many initiatives. Teaching staff reported fatigue and conflicting priorities, especially when entrepreneurship activities lacked recognition in career advancement structures. These

patterns suggest that, without a comprehensive institutional strategy, entrepreneurial initiatives risk becoming peripheral or unsustainable.

### 4.4. Strategic and Systemic Implications

The study reinforces the idea that entrepreneurship education must be embedded within strategic governance, supported by adequate resourcing, and articulated through coherent institutional structures. The PIN has served as a catalyst for innovation, but its impact is limited by the absence of formal governance mechanisms, shared digital tools, and monitoring instruments.

From a Triple Helix perspective, the collaboration between academia, government, and industry remains more aspirational than operational. The potential for external stakeholder engagement is high but unevenly realized. Several institutions lacked structured outreach programs or consistent alumni engagement strategies, which are essential for sustained entrepreneurial ecosystems (Audretsch, 2014; Guerrero et al., 2015).

Additionally, the study reveals a critical gap in evaluation and sustainability planning. Financial constraints, limited staff development programs, and the absence of monitoring frameworks were frequently cited as limitations, highlighting the need for institutional and systemic reforms.

### 4.5. Unexpected Findings and Tensions

Despite a shared commitment to entrepreneurship education, several tensions emerged. Notably, there was a clear disconnect between national policy aspirations and local institutional autonomy. HEIs expressed difficulties in aligning external expectations with internal capacity, often citing the lack of resources or rigid bureaucratic structures.

Student engagement was often hindered by overlapping curricular demands and the perception that entrepreneurship was extracurricular rather than integrated. Furthermore, while faculty generally viewed entrepreneurship positively, many expressed concerns over insufficient pedagogical training, lack of recognition, and workload implications.

These tensions underscore a broader issue: without robust governance and sustainable funding models, networks like PIN risk being perceived as externally imposed, rather than organically embedded within institutional strategy.

### 4.6. Hypotheses for Future Testing

The qualitative data and comparative analysis allow for the formulation of hypotheses that could guide future research:

- The existence of dedicated entrepreneurship units or offices is positively correlated with deeper curricular integration and sustained institutional engagement. Inter-institutional collaboration is more likely when supported by joint funding mechanisms and shared governance structures.
- Faculty involvement in entrepreneurship education increases when linked to formal recognition, pedagogical support, and career incentives.
- Student participation grows when entrepreneurship is embedded in the core curriculum and linked to real-world employability outcomes.

Future studies should consider using mixed methods approach to test these hypotheses. Quantitative metrics such as the number of students enrolled in entrepreneurship courses, startup formation rates, incubator outputs, or faculty development programs could offer robust indicators to complement qualitative insights. The establishment of such metrics could form the basis for national or institutional benchmarking frameworks.

## 5. Conclusion

This study provides a critical and multi-institutional analysis of entrepreneurship education within Portuguese Higher Education Institutions (HEIs) participating in the Polientrepreneurship Innovation Network (PIN). The

findings reveal that while substantial progress has been made—including the integration of entrepreneurship into curricular structures, the development of incubation programmes, and the establishment of partnerships with external stakeholders—several structural and strategic challenges remain. These include inconsistencies in human resource management, insufficient funding models, and the lack of formal evaluation mechanisms to monitor the effectiveness and long-term impact of entrepreneurial initiatives.

The research underscores the need to institutionalize entrepreneurship education through coherent strategies that prioritize faculty development, financial sustainability, and systematic quality assurance. Moreover, the study highlights the importance of leadership, cross-institutional collaboration, and policy alignment in fostering an entrepreneurial culture capable of responding to the evolving demands of the labor market and innovation systems.

By structuring the analysis around a revised version of the Framework Conditions Index (FCI) and embedding it within the theoretical lenses of entrepreneurial universities and Triple Helix models, the study contributes a conceptual model that may inform both institutional practices and policy development in this domain. It also enriches the academic debate by proposing a multi-dimensional framework linking strategy, infrastructure, pedagogy, outreach, and evaluation to measurable educational outcomes.

Nevertheless, the scope of the study is bounded by its qualitative nature and its focus on a specific network of public HEIs in Portugal. These boundaries limit the generalizability of the findings, although they offer valuable exploratory insights into system-level dynamics. Future research should expand the analytical scope by including private institutions and applying longitudinal or mixed methods approach. To amplify PIN's impact, integrating holistic models like W.O.M.B. (de Almeida Leite et al., 2024)—which ties innovation to psychological well-being and sustainability—could align the network with Industry 5.0 and digital economy demands. Additionally, the use of quantitative indicators—such as entrepreneurship course enrolments, incubation outcomes, and faculty engagement metrics—would strengthen the empirical foundation for comparative studies.

Finally, integrating recent literature on digital transformation, sustainability, and post-pandemic innovation ecosystems will be critical for contextualizing entrepreneurship education within contemporary global challenges. As HEIs evolve into more agile and socially engaged institutions, entrepreneurship education must be strategically positioned at the intersection of academic excellence, societal relevance, and systemic innovation.

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