How to Boost Entrepreneurship and Innovation in Higher Education Institutions

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Abstract: Entrepreneurship and innovation are critical drivers of economic growth, employment creation, and societal development. Higher Education Institutions (HEIs) play a key role in fostering entrepreneurial mindsets and creating innovation-driven ecosystems. However, many universities face challenges, including rigid academic structures, limited industry linkages, and insufficient support programs for academic startups. Against this background, the purpose of this paper is to explore strategies to enhance entrepreneurship and innovation in HEIs by integrating entrepreneurship education, establishing innovation hubs, strengthening industry-academia partnerships, and improving access to funding and mentorship. A robust entrepreneurial ecosystem within HEIs requires a multidisciplinary approach that embeds entrepreneurship in curricula across disciplines. This includes experiential learning methodologies such as business simulations, bootcamps, project-based collaborations, and startup incubators, allowing students to develop problem-solving and risk-taking skills, as well as consider creating their own company as a way of employability. Additionally, faculty members' engagement in entrepreneurial activities, supported by incentives for research commercialization, is crucial for fostering a culture of innovation. This study examines INOPOL – The Entrepreneurship Academy of the Polytechnic University of Coimbra (PUC) – as a case study to illustrate how academic institutions can foster entrepreneurial ecosystems. The findings indicate that INOPOL has played a significant role in integrating entrepreneurship education, promoting innovation, supporting business creation, and facilitating collaboration between academia and industry. A key initiative, Poliempreende, is a national program that provides mentorship, networking, financial support, and incubation opportunities for student-led startups within the polytechnic education network. The results also point out the importance of strategic partnerships in strengthening entrepreneurial ecosystems, providing students with practical experience, mentorship, employment opportunities, and access to funding. Furthermore, the adoption of intellectual property policies that promote technology transfer and the valorisation of research outputs emerges as a crucial success factor. INOPOL has contributed to advancing PUC's third mission while providing a dynamic and transferable model for integrating entrepreneurship and innovation in higher education.

Keywords: Entrepreneurship; Innovation; Higher Education Institutions; INOPOL; Academic Incubators; Entrepreneurial Ecosystem.

1. Introduction and Background

In a global economy characterized by high competitiveness and rapid technological change, entrepreneurship and innovation have emerged as key drivers of job creation, economic diversification, and sustainable development (Proença and Soukiazis, 2023). Technological advancements and shifting economic and labour market paradigms highlight the need for individuals to have not only technical expertise but also entrepreneurial skills and abilities to enable them to deal with current world challenges (Ghina et al., 2017). In this context, Higher Education Institutions (HEIs) are in a favourable position to promote entrepreneurial mindsets and foster innovation-driven ecosystems by embedding innovation approaches into curricula, research, and community engagement (Porkodi et al., 2023; Oliveira et al., 2024). Recent studies further emphasize the importance of HEIs in promoting academic entrepreneurship and facilitating the creation of spinoffs as a means of transferring the knowledge produced by the research activities, thereby contributing directly to economic development (Pacheco et al., 2023).

Traditionally, universities have prioritized teaching and research, often within rigid disciplinary boundaries. However, this conventional model is increasingly being challenged by the demand for more agile, interdisciplinary approaches that bridge the gap between knowledge creation and its practical application and valorisation. Higher education institutions need, therefore, to advance into proactive agents of change, equipping students, professors, researchers, and staff with the competencies, tools, and opportunities required to transform knowledge into innovation through new products, services, or ventures. This paradigm shift requires institutional strategies and policies able to integrate entrepreneurship into curricula, foster a culture of innovation, promote research outputs commercialization, and strengthen collaborations with external stakeholders (Etzkowitz et al., 2000; Pacheco et al., 2023; Oliveira et al., 2024).

In recent decades, the intersections between entrepreneurship, innovation, and higher education have become a growing area of interest in both academic and policymaking agendas (Etzkowitz et al., 2000; Guerrero and Urbano, 2012; OECD, 2019). Universities are no longer viewed only as centres for knowledge dissemination but as key actors in regional and national economic development through the generation, diffusion, and valorisation of knowledge.

Against this background, one relevant topic in the literature is the integration of entrepreneurship education into academic curricula. According to Fayolle and Gailly (2008), entrepreneurship education enhances students' entrepreneurial intentions and self-efficacy by providing them with the knowledge, skills, and attitudes needed to identify and exploit opportunities. Business simulations, startup bootcamps, and project-based partnerships are examples of experiential learning strategies that are particularly successful in encouraging active learning and practical application (Rae, 2006; 2007). More recently, Rodrigues (2023) also emphasized the significance of experiential and interdisciplinary learning methodologies such as design thinking and problem-based learning, which have shown significant potential in developing students' entrepreneurial mindset. These findings demonstrate the important role of HEIs in promoting entrepreneurial competencies through collaborative pedagogical models. Similar results have been reported by Santos et al. (2024), which support the idea that innovative active learning methodologies are an effective approach to enhance students' engagement and learning experience. Porkodi et al. (2023), in turn, give evidence of a positive correlation between institutional support and the development of entrepreneurial skills, highlighting the importance of creating an environment that fosters creativity, risk-taking, and innovation. Finally, Passarelli et al. (2025), in a recent comprehensive systematic literature review, point out that entrepreneurship education needs to evolve toward more holistic and multidisciplinary approaches. The findings ask for integrating fields like psychology, ethics, and neuroscience into entrepreneurship training to improve entrepreneurship education frameworks and therefore prepare more adaptable and impact-driven entrepreneurs. Nevertheless, many HEIs still lack the institutional flexibility to incorporate such innovative pedagogical approaches across disciplines.

Another critical factor discussed in the literature is the role of academic incubators and innovation hubs. These structures function as physical and intellectual spaces where students, researchers, and industry stakeholders can work together to transform ideas into new solutions and new ventures (Mian, 1997). Incubators not only provide infrastructure and support services but also foster a culture of entrepreneurship within the academic environment. Studies demonstrate that the success of such initiatives depends mainly on clear institutional strategies, leadership commitment, and sustained resource investment (Grimaldi and Grandi, 2005). In the same view, Marques et al. (2023) point out that non-formal and informal entrepreneurial learning activities, especially those developed in collaboration with external stakeholders, can significantly enhance entrepreneurial learning outcomes. Their work underlines the role of co-creation and inter-organizational collaboration in shaping successful innovation ecosystems within HEIs.

The literature further highlights the significance of industry-academia partnerships in fostering innovation. Collaborative activities with business partners enable HEIs to align research agendas with market needs and enhance students' employability through internships, mentorship, and co-creation projects. Effective partnerships also contribute to a more dynamic innovation ecosystem by facilitating access to funding, real-world problem-solving opportunities, and commercialization pathways, mainly through intellectual property valorisation and academic entrepreneurship (Perkmann et al., 2013). In addition, the role of policy and intellectual property (IP) frameworks is also widely discussed. According to OECD (2009), supportive policies at the institutional and national levels, such as entrepreneurship strategies, funding support schemes, and IP regulations, are critical for empowering technology transfer and the entrepreneurial exploitation of research outputs.

Overall, the insights from the above literature review demonstrate the need for a holistic and systemic approach to promote entrepreneurship and innovation in higher education. There is a consensus that successful entrepreneurship education and innovation in HEIs require coordinated efforts across curriculum, infrastructure, institutional culture, leadership, and policy frameworks. However, while progress has been made, substantial barriers remain, particularly in effective implementation, interdisciplinary integration, and sustainable ecosystem development.

The present study aims to contribute to this debate by examining a case study within the context of a Portuguese higher education institution - the Polytechnic University of Coimbra (PUC), a public institution recognized for its focus on applied sciences, innovation, and strong regional engagement. Founded in 1979, PUC serves over 12,000 students across six diverse schools, offering programs in engineering, education, health, management,

agriculture, and arts (see Figure 1). Specifically, this paper explores how PUC integrates the promotion of entrepreneurship into its institutional mission and contributes to a culture of innovation both within the university and in the broader regional ecosystem, focusing on INOPOL - the Entrepreneurship Academy at the Polytechnic University of Coimbra.

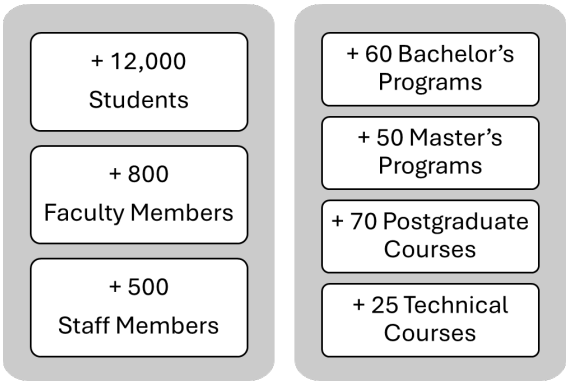

Figure 1: PUC´s characterization

The remainder of this paper is structured as follows: Section 2 outlines the methodology used in the empirical analysis. Section 3 presents and discusses the main findings. Section 4 concludes with key insights and policy recommendations.

2. Methodology

The paper employs a qualitative case study methodology to explore how Higher Education Institutions (HEIs) can promote entrepreneurship and innovation. Focusing on the PUC´s Entrepreneurship Academy, this research aims to identify and analyse strategies, practices, and institutional resources that support academic entrepreneurship and innovation. The case study intends to produce insights and good practices that can be adapted or replicated by other HEIs seeking to develop innovation-driven ecosystems.

The case study approach was selected as a research methodology due to its ability to provide depth and a holistic understanding of a bounded entity or phenomenon within its real context (Denzin and Lincoln, 1994; Burns, 1998). As Stake (2003) points out, a case study "is not a methodological choice but a choice of what is to be studied. By whatever methods, we choose to study the case" (p.134). This research design is particularly useful for exploratory and descriptive studies aiming to generate practical and context-specific insights.

The research methodology combines documentary analysis with institutional data collection. Data sources include a review of PUC's strategic and operational documents, such as institutional development plans, program guidelines, internal reports, performance indicators, and annual activity reports from 2021 to 2024. Additionally, the study draws on academic and policy literature related to entrepreneurship and innovation in higher education. Secondary data were therefore collected from relevant literature to contextualize the case, as discussed in the introduction.

The study is exploratory and descriptive in nature, aiming to generate contextual insights rather than test specific hypotheses. The primary goal is to understand how institutional frameworks, educational practices, and external partnerships converge to support the development of an innovation and entrepreneurship ecosystem within an HEI context. The exploratory design allows for the identification of emerging patterns and practices, while the descriptive focus provides a detailed account of the specific strategies and mechanisms implemented at INOPOL. Furthermore, the research aims to offer insights and contribute to the ongoing discussion on how HEIs can build and foster an entrepreneurial culture.

3. Findings and Discussion

The case study of the INOPOL – the Entrepreneurship Academy of the Polytechnic University of Coimbra (PUC) shows a comprehensive institutional framework for promoting entrepreneurship and innovation in a higher education context, rooted in strategic alignment, experiential learning, and ecosystem collaboration. The analysis allowed identifying three core dimensions contributing to the development of PUC's entrepreneurial environment: (1) strategic integration, (2) pedagogical innovation and capacity-building, and (3) ecosystem engagement (INOPOL, 2022).

The INOPOL, as an organic unit of the PUC, was founded in July 2021 at the initiative of the institution's presidency. Its creation was driven by a strategic goal to integrate and strengthen entrepreneurship and innovation initiatives, aligning with PUC's broader mission to promote applied knowledge and regional development. Designed to operate transversally across all PUC´s six schools, INOPOL is a hub for fostering an entrepreneurial and innovative culture, supporting early-stage ventures, and reinforcing the interface between academia and society (INOPOL, 2022).

From an organizational point of view, INOPOL functions as an Organic Unit for Training and Development Support, endowed with statutory, cultural, administrative, and disciplinary autonomy. This autonomy enables more flexible and dynamic operations while being coupled with institutional accountability mechanisms. Oversight is ensured by the PUC President and the Management Council, guaranteeing alignment with the strategic guidelines and activity plans approved by the General Council. INOPOL's governance structure comprises three key actors: the director, responsible for the unit's strategic and operational leadership; the administrative council, which manages financial and budgetary resources; and the strategic council, a consultative body supporting strategic planning and providing recommendations for systemic improvement. This governance model reinforces institutional legitimacy and promotes more effective operations. The strategic council ensures participation from diverse stakeholders, encouraging interdisciplinary collaboration and responsiveness to regional innovation dynamics. The definition of key performance indicators (e.g., number of incubated startups, participation in training programmes, intellectual property outputs) also reflects INOPOL's commitment to a results-driven innovation culture (IPC, 2024).

The documentary analysis gives evidence that INOPOL´s activity is centred on four main pillars (INOPOL, 2022), as follows:

i) Capacity Building and Networking

INOPOL promotes a wide range of programs and activities aimed at developing an entrepreneurial mindset among students, academic staff, and alumni. These initiatives include workshops, bootcamps, idea acceleration, pre-incubation programs, mentorship support, and networking events. They are based on experimental methodologies, such as design thinking, interdisciplinary teamwork, project-based learning, and real-world problem-solving, active learning approaches shown in the literature to be effective in entrepreneurship education (Rae, 2006; Rodrigues, 2023). The involvement of students and faculty from several academic backgrounds promotes interdisciplinary innovation and increases institutional impact. Additionally, the integration of external mentors, successful entrepreneurs, and alumni into INOPOL's training programs facilitates the transfer of practical knowledge and strengthens its connection to the entrepreneurial ecosystem. These practices align with Perkmann et al. (2013), who stress the importance of industry-academia linkages in fostering innovation.

ii) Knowledge Valorisation

The protection and valorisation of scientific and technological knowledge generated within the academic community is a central objective of INOPOL´s mission. To this end, INOPOL provides comprehensive support services to manage intellectual property (IP) assets and facilitate the knowledge transfer to society and industry. These actions are in line with the EU Guiding Principles for Knowledge Valorisation, which advocate the transformation of research outputs into societal and economic benefits through strategic IP management and stakeholder collaboration (European Commission, 2022).

INOPOL's services include providing specialized information on IP and relevant legal frameworks; support in conducting searches in IP databases; and assistance in preparing and submitting applications for patents, trademarks, and other forms of protection. The institution also manages the formalization and administration of IP rights attribution processes, ensuring proper legal and administrative follow-up, practices that are essential to maximize the potential of innovation (Teece, 1986). In addition to protection, INOPOL supports valorisation of these assets through diagnostic tools for IP use, technology transfer agreements, licensing support, and spin-off creation. These approaches are consistent with previous findings from Hladchenko (2016), which points out how universities can create surplus value by fostering collaborative knowledge flows between academia and industry. Moreover, INOPOL also promotes collaboration with companies interested in academic research outputs, reflecting the role of Technology Transfer Offices (TTOs) in academic entrepreneurship, as examined in the Italian context by Muscio (2013). These partnerships are central for shaping university spin-offs and commercializing research, which contribute to regional innovation systems (Clarysse et al., 2005). Recent

research also emphasizes that successful knowledge valorisation depends on a robust institutional framework that supports licensing, contract negotiation, and stakeholder engagement (Ramzi et al., 2023). INOPOL's approach thus reflects international best practices and strategic policy alignment for translating academic research into tangible economic and societal value.

iii) Business Incubation

INOPOL also functions as an academic-based incubator with dedicated infrastructure, including co-working spaces, incubation facilities, and access to research, development, and innovation (I&D+I) laboratories. This environment nurtures entrepreneurial growth by providing tailored support throughout the entrepreneurial journey, from ideation to venture creation and expansion. While the primary focus is on supporting startups and spin-offs arising from the PUC academic community, INOPOL's incubation services are also available to entrepreneurs from the wider regional ecosystem. This dual approach, which promotes both academic and regional entrepreneurship, improves INOPOL's role as a facilitator of knowledge-based economic development. Such hybrid incubators, integrated within academic institutions yet accessible to external members, have been shown to cultivate more robust innovation ecosystems by leveraging academic knowledge while addressing regional economic needs (Grimaldi & Grandi, 2005).

INOPOL's activities are enhanced by national programs like Poliempreende, the largest network promoting entrepreneurship within Portuguese polytechnic higher education. This program aims to stimulate creativity, innovation, and the development of entrepreneurial skills through a competition that includes both regional and national phases. Participants receive structured mentorship, training, and support in developing business plans, culminating in opportunities for funding and access to incubation (Paiva et al., 2019). These initiatives strengthen the support infrastructure for early-stage entrepreneurs and contribute to transforming academic research into business ventures. This approach is supported by previous research on academic incubators, demonstrating their effectiveness in facilitating new venture creation by offering access to resources, mentoring, and networks (Mian, 1997; Grimaldi & Grandi, 2005). Specifically, Mian (1997) shows how academic incubators benefit from access to intellectual capital, specialized facilities, and a culture of innovation, key factors also apparent in INOPOL's operation.

iv) Employability Promotion

A fourth strategic pillar of INOPOL is to support the employability of PUC students and graduates, focusing on facilitating their professional integration and supporting their career development trajectories. In this context, INOPOL implements targeted training programs that promote the development of transversal and future-oriented skills, thereby aligning graduates' competencies with current labour market expectations. This approach is consistent with findings from García-Álvarez et al. (2022), which point out that employers increasingly value transversal competencies such as critical thinking, adaptability, and communication in recent graduates. In addition to training, INOPOL provides support services, including career planning, active job search strategies, and professional integration activities. These initiatives contribute to bridging the gap between higher education and employment, a challenge well-documented in the literature (Abelha et al., 2020). Moreover, recent studies underline that project-based and experiential learning approaches, similar to those adopted in INOPOL's methodology, have shown significant effectiveness in enhancing student employability in higher education contexts (Li & Jansaeng, 2025; Proença et al., 2023). Such strategies not only reinforce the institution's commitment to student success beyond graduation but also align with international best practices advocating stronger academia-industry collaboration and the continuous development of employability skills.

When combined, these four strategic pillars demonstrate how a higher education institution can create and implement an integrated model that promotes entrepreneurship, facilitates knowledge transfer, supports regional development, and improves the employability of graduates.

The documentary analysis also gives evidence that a defining feature of INOPOL is its active engagement with external stakeholders, including local government, business associations, regional incubators, and private sector organizations (INOPOL, 2024a, 2023a). Strategic partnerships with these entities have enabled the co-creation of entrepreneurship and innovation programs tailored to regional economic needs and facilitated access to competitive funding, internships, co-innovation projects, venture capital networks, and pathways for applied research valorisation. These partnerships not only enhance students' entrepreneurial experiences but also ensure alignment between educational outputs and labour market needs (Perkmann et al., 2013; Marques et al., 2023).

The findings from this case study reinforce theoretical insights from the literature on academic entrepreneurship, which suggest that fostering entrepreneurship and innovation in HEIs requires more than isolated initiatives. INOPOL illustrates how a dedicated entrepreneurship unit, supported by institutional vision, leadership commitment, and strategic alignment, can drive the transformation towards an entrepreneurial culture within higher education (Etzkowitz et al., 2000; Porkodi et al., 2023). PUC's integration of entrepreneurship and innovation as a transversal and strategic axis in its institutional mission, along with an emphasis on hands-on learning, mentorship, and interdisciplinarity, reflects a model consistent with recent recommendations for more holistic and impact-oriented entrepreneurship education (Passarelli and Bongiorno, 2025; Rodrigues, 2023). The institutional commitment indicates the systemic change necessary for HEIs to fully embrace their third mission - contributing to social and economic development alongside teaching and research (Etzkowitz et al., 2000). Moreover, INOPOL's ability to engage with external stakeholders and integrate real-world challenges into its programs exemplifies the co-creation and ecosystem-building approaches recommended by recent research (Rodrigues, 2023; Marques et al., 2023). The case of INOPOL further illustrates the value of institutional autonomy in designing and implementing flexible and responsive entrepreneurship strategies adapted to local contexts. Its integrated approach, combining capacity building, incubation, and stakeholder engagement, represents a holistic model for embedding entrepreneurship within the academic environment. These outcomes reinforce the need for HEIs to develop systemic, cross-cutting strategies that promote innovation at all institutional levels. Moreover, INOPOL manages intellectual property (IP) and facilitates technology transfer, playing an important role in the valorisation of academic research. These activities have contributed to bridging the gap between scientific knowledge and market needs, addressing a common challenge faced by HEIs (European Commission, 2022; OECD, 2009). The institution also actively promotes integration into national and international innovation networks and consortia, leveraging external partnerships to support entrepreneurial activity and graduates' employability.

3.1 Impact Assessment

The analysis of INOPOL's activity over the period 2022-2024 reveals a consistent alignment with its institutional mission, producing measurable and meaningful outcomes across various strategic domains, as illustrated in Figure 1 (INOPOL 2025, 2024b, 2023b). Over this period, INOPOL implemented 224 activities designed to promote entrepreneurial thinking and innovation across the academic community. These initiatives reached more than 7,000 individuals (including students, graduates, professors, researchers, and administrative staff), underscoring the academy's institutional engagement. Furthermore, INOPOL provided direct support to 143 entrepreneurial projects and played a significant role in research valorisation, facilitating 62 intellectual property registrations and contributing to the creation of 10 spinoff ventures. The academy also incubated 35 startups, supported over 10 ignition projects and proofs of concept, and reinforced collaborative ecosystems by forming 46 institutional partnerships and participating in 13 multi-institutional consortia or network-based initiatives. Globally, these efforts contributed to raising €2.6 million in competitive funding, further consolidating INOPOL's contribution to a sustainable academic entrepreneurship ecosystem.

Table 1: INOPOL's key impact indicators (2022 - 2024)

Impact Area	Indicator	Value
Entrepreneurial Engagement	Total activities promoting entrepreneurship	224 activities
	Individuals reached (students, faculty, etc.)	Over 7,000 participants
Project and Venture Support	Entrepreneurial projects supported	143 projects
	Ventures receiving incubation support	35 ventures
	Ignition projects and proofs of concept supported	More than 10 initiatives
Research Valorisation	Intellectual property (IP) registrations	62 IP registrations
	Spinoff ventures created	10 spinoffs
Partnerships and Networks	Institutional partnerships formed	46 partnerships
	Participation in consortium/network-based projects	13 collaborative projects
Funding	Competitive funding raised	€2.6 million

4. Conclusion and Recommendations

Entrepreneurship and innovation are increasingly recognized as critical components of higher education's mission to prepare graduates for the complexities of the 21st-century economy. This study examined how the Polytechnic University of Coimbra (PUC), through its organic unit INOPOL Entrepreneurship Academy, has established a strategy to promote entrepreneurship and innovation within a higher education context. The INOPOL case study demonstrates how specialised, institutionally driven structures inside HEIs can support innovation, academic entrepreneurship, knowledge valorisation, and regional development. By integrating entrepreneurial capacity-building programs, technology transfer mechanisms, business incubation services, and employability initiatives, INOPOL has advanced PUC's third mission of contributing to societal and economic development.

The documentary analysis gives evidence that INOPOL has operationalized the vision of an entrepreneurial university by promoting interdisciplinary collaboration, engaging with external stakeholders, and embedding real-world challenges into academic practices. The outcomes, including the number of supported ventures, intellectual property registrations, and external partnerships, highlight the tangible institutional impact of this initiative. This approach reflects broader trends in academic entrepreneurship, emphasizing systemic, integrated, institution-wide, practice-based, and ecosystem-oriented strategies.

Nevertheless, several challenges remain that call for attention. First, the scalability and long-term sustainability of INOPOL's activities require consistent institutional support, including dedicated funding mechanisms and structural integration within academic programs. Second, while extracurricular initiatives have proven effective, a deeper curricular integration of entrepreneurial learning could extend participation and normalize innovation practices across disciplines. Third, equity and inclusivity in entrepreneurial engagement remain central to ensure that all academic community members can access and benefit from these opportunities.

Based on the findings of this case study, the following recommendations are proposed for HEIs aiming to strengthen their entrepreneurial and innovation capacity: i) Ensure institutional commitment and sustainable funding. Institutional leadership should continuously reinforce entrepreneurship culture as a core component of the university's mission and ensure stable and long-term funding sources, both internal and external, to maintain operational capacity and strategic autonomy. ii) Integrate entrepreneurship and innovation competencies within formal curricula, ensuring alignment with pedagogical best practices such as project-based learning, interdisciplinary collaboration, and experiential methods. iii) Invest in dedicated infrastructure such as incubators and innovation hubs that provide physical space, mentoring, and access to resources needed to develop entrepreneurial projects. iv) Establish incentives for faculty to engage in entrepreneurship education and research transfer, including funding, recognition, and career development opportunities. v) Enhance ecosystem collaboration. Partnerships with industry, government, and civil society to co-create innovation agendas, expand applied research opportunities, and connect academic entrepreneurship with regional and national development goals. vi) Promote internationalization and benchmarking, positioning within broader international networks of academic entrepreneurship to share best practices, access new funding opportunities, and benchmark performance against global standards.

In conclusion, INOPOL presents a dynamic and transferable model for including entrepreneurship in higher education. Its experience reinforces the view that institutional innovation, when guided by strategic direction and ecosystem-embedded, can significantly enhance a university's capacity to contribute to socio-economic development. By transcending traditional academic boundaries, INOPOL not only fosters interdisciplinary collaboration and stakeholder engagement but also delivers tangible outcomes, including startup creation, technology transfer, and regional partnerships, that reflect its measurable and institutional impact. Future studies should investigate comparative findings from similar initiatives across different higher education institutions as well as longitudinal effects.

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Ethics Declaration

Ethics approval was not required for the present study.

AI Declaration

The author acknowledges the use of AI-assisted tools for language refinement.

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