



BRILL

TRIPLE HELIX (2026) 1–31

TRIPLE
HELIX

brill.com/thj

Nurturing Entrepreneurship in a Small-Country Innovation Ecosystem

*The Case of Malta College of Arts, Science and Technology (MCAST)
as an Entrepreneurial Vocational Higher Education Institution*

Maria Lima-Toivanen | ORCID: 0000-0002-3530-1378

Innovation Project Manager, Sustainable Innovation Technology Services
Ltd (SITES), Limerick, Ireland; CEO Innodeva, Belo Horizonte, Brazil

Corresponding author

maria.limatoivanen@innodeva.com.br

David Pace

Subject Coordinator, Entrepreneurship, Senior Lecturer,
Institute of Engineering and Transport, Malta College of Arts Science &
Technology, Paola, Malta

David.P.Pace@mcast.edu.mt

Ivan Briffa

Senior Lecturer, Institute of Communication and Information Technology,
Malta College of Arts Science & Technology, Paola, Malta

Ivan.Briffa@mcast.edu.mt

Pelin Uner

Independent researcher, Paola, Malta

pelinuner@hotmail.com

Maria Ragia

Independent researcher, Paola, Malta

maria.ragia@outlook.com.gr

Leonardo Piccinetti | ORCID: 0000-0002-7861-5668

CEO, Sustainable Innovation Technologies Ltd (SITES),

PhD candidate, University of Chester, Chester, UK

leonardo@sinnovations.org

Received 24 March 2025 | Accepted 20 May 2026 |

Published online 24 June 2026

Abstract

Entrepreneurial higher education institutions (HEIs) are key drivers of innovation, employability, and sustainable development, yet research has largely overlooked vocational HEIs in small-country contexts. This paper analyses the Malta College of Arts, Science and Technology (MCAST) as an entrepreneurial HEI within Malta's compact innovation ecosystem. Guided by the Triple and Quadruple Helix frameworks, it examines how entrepreneurship education, institutional support, and stakeholder collaboration shape competences, mindsets, and innovation capacity. The qualitative case study draws on interviews with management, lecturers, industry, and government representatives, a focus group with alumni, and analysis of institutional and EU project documents. Findings suggest that entrepreneurship is embedded as a transversal competence, with experiential and challenge-based learning fostering adaptability and creativity aligned with labour-market needs. The study extends the entrepreneurial HEI concept to vocational and small-country contexts and offers insights for policies that advance locally grounded yet globally connected innovation ecosystems.

Keywords

Entrepreneurial Higher Education Institution – innovation ecosystems – small countries – entrepreneurship education – Malta

1 Introduction

Entrepreneurial higher education institutions (HEIs) have become key actors in fostering innovation, employability, and regional development. The concept of the entrepreneurial university, introduced by Etzkowitz and Leydesdorff (2000), situates higher education within the Triple Helix of university-industry-government relations, reframing universities as catalysts of economic growth through research commercialisation, knowledge transfer, and entrepreneurial culture. This model evolved into the Quadruple Helix (Carayannis & Campbell, 2009), integrating civil society and recognising the social and cultural dimensions of innovation. Entrepreneurial HEIs are thus understood not only as generators of start-ups and patents but also as

cultivators of entrepreneurial mindsets that enable graduates to navigate complex economic and societal challenges.

While the entrepreneurial university concept is well established, research has largely focused on research-intensive institutions in large economies, leaving vocational and professional HEIs comparatively underexplored (Syed et al., 2023). These institutions play a distinctive role in small and island states, where limited resources, close stakeholder proximity, and strong policy interdependence shape innovation dynamics. As Georghiou et al. (2014) note, small-country innovation systems depend on dense networks and agile collaboration but face constraints such as limited research and development (R&D) capacity and reliance on international partnerships. Such conditions make them fertile contexts for examining how entrepreneurial transformation unfolds under constraint and how HEIs mediate between education, policy, and innovation ecosystems.

Vocational HEIs are especially well-placed to link education with employability through experiential learning and the development of transversal competences. Entrepreneurship education in these settings seeks to foster adaptability, creativity, and opportunity recognition, which are the core components of entrepreneurial competence (Fayolle & Gailly, 2015; Lackéus, 2015). However, empirical evidence remains limited on how vocational institutions integrate entrepreneurship into curricula, governance, and stakeholder engagement. The literature highlights unresolved issues regarding the effectiveness of entrepreneurship education in building competences and culture (Mutanda et al., 2018; Nikitina et al., 2020), the alignment of entrepreneurship teaching with institutional mission (Davey et al., 2016), and the influence of institutional and environmental factors on entrepreneurial intentions (Álvarez-Risco et al., 2021). These questions are particularly salient in small-country innovation ecosystems, where limited resources, close stakeholder proximity, and strong policy interdependence shape how HEIs enact their entrepreneurial mission. Understanding these processes is essential for advancing theory and guiding policy toward inclusive and sustainable growth aligned with the Sustainable Development Goals (SDGs), notably SDG 4 (Quality Education), SDG 8 (Decent Work), SDG 9 (Industry, Innovation and Infrastructure), and SDG 10 (Reduced Inequalities).

Recent studies have broadened the entrepreneurial HEI concept to include diverse institutional missions. Syed et al. (2023) describe entrepreneurial HEIs as organisations that embed entrepreneurship across education, research, and governance, while Syed and Spicer (2025) emphasise a stakeholder-centric approach consistent with the Quadruple Helix, where institutional entrepreneurship emerges from collaboration among government, industry, academia,

and society. Entrepreneurship is thus reframed as a systemic capability for addressing societal challenges, not merely as a mechanism for venture creation. In line with this perspective, the European Commission's EntreComp framework conceptualises entrepreneurship as a transversal competence fundamental to employability and innovation. It defines entrepreneurship as the capacity to act upon opportunities and ideas to create value for others, emphasising the importance of embedding entrepreneurial learning across disciplines and qualification levels (Bacigalupo et al., 2016).

In small and open economies, entrepreneurial transformation often relies on adaptability and dense stakeholder collaboration. As Georghiou et al. (2014) argue, small-state innovation systems benefit from proximity and short coordination chains, which facilitate cooperation between education providers, government agencies, and employers. Nevertheless, the limited market size also constrains infrastructure development and scalability (Jucevičius et al., 2017; Suseno & Standing, 2017). Consequently, HEIs in such contexts frequently depend on international cooperation to build capacity, access knowledge networks, and extend impact (Etzkowitz, 2021). Malta exemplifies these dynamics. With a population of just over half a million and an economy dominated by small and medium-sized enterprises (SMEs), the country depends on a highly adaptable workforce.

The Malta College of Arts, Science and Technology (MCAST), Malta's main vocational HEI, plays a pivotal role in linking education, employability, and innovation within this compact ecosystem, consistent with entrepreneurial HEI models that emphasise ecosystem alignment and stakeholder integration (Guerrero & Urbano, 2012; Syed et al., 2023). Its Strategic Plan 2022–2027 (MCAST, 2022) identifies entrepreneurship and sustainability as cross-cutting priorities, and the MCAST Act (2023) formally embeds the promotion of an entrepreneurial culture within the institution's statutory mission. MCAST's transformation has also been reinforced through participation in European-funded projects¹ that exemplify Triple and Quadruple Helix collaboration.

Addressing these gaps, this study examines how a vocational HEI enacts its entrepreneurial mission under the specific conditions of a small-state context. It analyses how entrepreneurship education, institutional support, and

1 Key European-funded initiatives include Young Innovators (2021), which promoted systemic innovation in education and youth engagement; HEIght Phases I–II (2021–2023), aimed at fostering institutional entrepreneurship and sustainable innovation across European HEIs; Mobinno 2.0 (2022), which strengthened innovation and entrepreneurial competences in mobility; WATERLINE (2022–2025), aimed at creating a European Digital Water Higher Education Alliance based on the Quadruple Helix model; and EXCEL Winter School (2023–2024), which promoted experiential learning and entrepreneurship in sustainable urban mobility.

stakeholder collaboration interact to build competences, mindsets, and innovation capacity. By examining the case of MCAST in Malta, the study contributes to the literature on entrepreneurial HEIs by showing how vocational HEIs in small-country contexts can combine entrepreneurship education, ecosystem engagement, and international collaboration to support entrepreneurial development.

The paper proceeds as follows: Section 2 reviews the literature on entrepreneurial HEIs, the Triple and Quadruple Helix frameworks, entrepreneurship education, and small-country innovation systems. Section 3 outlines the methodological approach. Section 4 presents the results, followed by discussion in Section 5. Section 6 concludes with key contributions, implications, and suggestions for future research.

2 Literature Review

2.1 *Entrepreneurial HEIs: Evolution and Perspectives*

The increasing recognition of entrepreneurial universities as catalysts for regional innovation and economic resilience has spurred extensive scholarly debate on their role in diverse economic and institutional contexts. Etzkowitz and Leydesdorff (2000) conceptualise universities as dynamic actors within the Triple Helix of university-industry-government relations, describing how institutional reform, diversified funding, and hybrid structures enable universities to contribute directly to socio-economic development.

Subsequent studies, including Guerrero and Urbano (2012) and Etzkowitz (2021), have broadened this view by framing entrepreneurial transformation as an evolutionary process shaped by both internal drivers (leadership, culture, and strategy) and external forces (policy, market, and ecosystem maturity). Thus, the university becomes a strategic organisation embedded in innovation systems that extend beyond academia.

More recent scholarship positions entrepreneurship as a defining attribute of HEIs with varied missions. Syed et al. (2023) define entrepreneurial HEIs as institutions that integrate entrepreneurship across governance, curriculum, and stakeholder engagement. Syed and Spicer (2025) deepen this discussion through a stakeholder-centric perspective, analysing how internal and external stakeholders shape entrepreneurial transformation. While their analysis remains within the Triple Helix framework, it highlights the importance of relational governance and ecosystemic alignment.

The present study extends this understanding by bridging the stakeholder perspective of Syed and Spicer (2025) with the Quadruple Helix approach, emphasising how societal actors and civil-society engagement expand the

scope of entrepreneurial HEIs toward inclusiveness and sustainability. Together, these frameworks portray entrepreneurial HEIs as agents of transformation that cultivate competences and mindsets aligned with regional needs while contributing to innovation-driven development (Guerrero & Urbano, 2012; Etzkowitz, 2021; Syed et al., 2023).

2.2 *Theoretical Frameworks: Triple and Quadruple Helix Models*

The Triple Helix model (Etzkowitz & Leydesdorff, 2000) remains central to innovation theory, describing innovation as the outcome of overlapping institutional spheres, academia, government, and industry. Recognising the growing importance of social actors, Carayannis and Campbell (2009) introduced the Quadruple Helix, adding civil society as a fourth component. This framework, echoed by Caro-González (2023), emphasises co-creation and media-based democracy, in which citizens and communities participate directly in innovation. Similarly, Ierapetritis (2019) illustrates how these helices strengthen regional collaboration through open-innovation networks.

The present study therefore advances this theoretical framework by incorporating the Quadruple Helix dimension, where societal participation and inclusiveness become integral to entrepreneurial transformation. This extension reflects a growing body of research calling for innovation ecosystems that address societal challenges and link technological progress with social well-being.

The helix frameworks are particularly relevant for small and open economies, where innovation depends on dense networks and trust among actors. Georghiou et al. (2014) show that small-state systems often compensate for limited research capacity with agility and inter-institutional cooperation. The Quadruple Helix lens captures these dynamics by incorporating societal feedback and user-driven innovation, which are key to addressing sustainability transitions in constrained environments.

Consequently, the helix perspective provides the conceptual foundation for this study: it situates entrepreneurial HEIs as mediating institutions that align education, policy, and industry while engaging citizens and communities in innovation processes.

2.3 *Entrepreneurship Education and Competence Development*

Entrepreneurship education has become a central mechanism through which HEIs foster innovation and employability. Mutanda et al. (2018) argue that it enables individuals to identify opportunities and mobilise resources for value creation, which is particularly relevant in resource-limited settings. In small

economies, Nikitina et al. (2020) stress the need to align educational objectives with domestic market demands to ensure relevance and sustainability.

Pedagogical theory highlights a shift from content transmission to experiential, competence-based learning. Fayolle and Gailly (2015) conceptualise entrepreneurship education as an integrative process encompassing cognitive, affective, and behavioural dimensions, while Lackéus (2015) frames it as value-creation pedagogy, where students learn by creating value for others through authentic projects. These approaches converge on the principle that entrepreneurship education should transform learners rather than merely inform them.

Reflection and educator agency are also critical. Ellis et al. (2011) introduce autoethnographic reflection as a way for teachers to analyse their own pedagogical practices, an approach particularly suited to entrepreneurship education, where modelling entrepreneurial behaviour fosters student engagement. Empirical evidence from Su et al. (2021) and Moraes et al. (2018) shows that experiential teaching significantly increases students' entrepreneurial intentions and perceived self-efficacy.

At the policy and conceptual level, the EntreComp framework positions entrepreneurial competences, including initiative, creativity, teamwork, and problem-solving, as foundational to value creation and innovation. It defines entrepreneurship as a transversal competence applicable across disciplines and qualification levels, thereby extending its relevance beyond business creation to broader societal and economic contexts (Bacigalupo et al., 2016). This framing reinforces the view that entrepreneurial learning constitutes an institutional responsibility for HEIs aiming to equip graduates for uncertain labour markets and to contribute to regional innovation ecosystems.

2.4 Entrepreneurial Mindset and Institutional Mission Alignment

An entrepreneurial mindset, characterised by opportunity recognition, adaptability, and resilience, is essential for translating competences into action (Davey et al., 2016). For HEIs, embedding such mindsets requires coherence between institutional mission, pedagogy, and stakeholder collaboration. Guerrero and Urbano (2012) highlight that successful entrepreneurial transformation depends on aligning leadership and organisational culture with external partnerships, while Syed et al. (2023) emphasise governance mechanisms that sustain these values.

Syed and Spicer (2025) expand this debate through their stakeholder lens, showing that entrepreneurial universities evolve through negotiated interactions among internal and external actors. Nonetheless, their analysis remains

largely bound by the Triple Helix logic. The present study moves this discussion forward by incorporating Quadruple Helix principles, through which societal actors co-define innovation agendas and contribute to educational design. This broader orientation underscores the social responsibility of HEIs and reinforces the multidimensional role of entrepreneurship in sustainable development.

Furthermore, studies by Fayolle and Gailly (2015) and Lackéus (2015) demonstrate that entrepreneurship education should develop both venture-creation skills and intrapreneurial and social-innovation capacities. Embedding these orientations across curricula transforms HEIs into arenas for collective value creation, supporting societal objectives such as inclusion and sustainability. This perspective aligns with broader European Union policy frameworks that integrate quality education, decent work, innovation, and social inclusion within the SDGs agenda, particularly SDGs 4, 8, 9, and 10 (European Commission, 2024).

2.5 *Small-Country Innovation Ecosystems and Institutional Mediation*

Innovation ecosystems in small countries present distinctive configurations shaped by limited scale, resource constraints, and close institutional proximity. Jucevičius et al. (2017) define small countries by both population or geography and the adaptive strategies of their innovation systems. Cao et al. (2023) and Suseno and Standing (2017) underscore that contextual factors, such as culture, policy, and infrastructure, determine how innovation networks evolve. Caro-González (2023) illustrates how inclusive Quadruple Helix collaborations, such as the Catalanian model for health and wellbeing, demonstrate how multi-actor engagement supports green and digital transitions even in resource-constrained environments.

Innovation ecosystem scholarship highlights the importance of interdependent relationships among firms, universities, and public institutions in generating collective capability and adaptive capacity (Etzkowitz & Leydesdorff, 2000; Suseno & Standing, 2017). In small or island economies, where market scale is inherently constrained, relational density and institutional proximity can compensate for size, enabling agility and responsiveness to technological change (Georghiou et al., 2014; Jucevičius et al., 2017).

Governments play a decisive role in sustaining these networks. Suseno and Standing (2017) and Berács (2014) highlight the importance of national policy frameworks that encourage collaboration, provide funding, and strengthen infrastructure. Small states therefore leverage international programmes such as Horizon Europe and the European Institute of Innovation and Technology Knowledge and Innovation Communities (EIT KICs) to strengthen research capacity and market integration (European Commission, 2022). Bedó et al.

(2020) and Guerrero and Urbano (2012) point out that cultural and structural factors, including market scale and institutional environment, can impede entrepreneurial university development.

Within these conditions, HEIs function as intermediaries and translators of knowledge. Their proximity to government and industry facilitates agile responses to national priorities, while international partnerships allow them to import and adapt global best practices. Georghiou et al. (2014), Carayannis and Campbell (2009), and Etzkowitz (2021) collectively demonstrate that entrepreneurial HEIs mediate between local ecosystems and global innovation flows, aligning education, research, and policy objectives to enhance societal impact. This dual role, local anchoring and international connectivity, renders small-country HEIs strategic actors in implementing sustainable and inclusive innovation agendas.

While these studies clarify the structural and policy conditions under which small-country HEIs operate, empirical research remains limited on how such institutions translate entrepreneurial mandates into educational practice and stakeholder engagement.

2.6 *Gaps and Research Questions*

Despite the maturity of research on entrepreneurial HEIs, several important gaps remain. As synthesised by Syed et al. (2023), most empirical studies focus on research-intensive universities in large economies, leaving vocational and applied HEIs comparatively underexplored, which was also pointed out by Etzkowitz (2021). These institutions often operate under distinct mandates and resource conditions, yet their role in fostering regional innovation, employability, and entrepreneurship is not sufficiently theorised or documented. Understanding how such institutions enact entrepreneurial functions within resource-constrained environments therefore remains an open research frontier.

A second gap concerns the translation of entrepreneurship education into measurable competences and mindsets. Although numerous studies recognise the value of entrepreneurship education for employability and economic development, less is known about how these outcomes are cultivated and assessed within small or vocational HEIs, and whether they align with the realities of small-economy labour markets (Mutanda et al., 2018; Nikitina et al., 2020). This gap calls for research linking pedagogical practices and transversal competences to contextual labour-market demands and employability outcomes.

A third knowledge gap relates to the influence of institutional support structures and environmental factors on students' entrepreneurial intentions and outcomes. Institutional culture, policy alignment, and ecosystem

connectivity can significantly shape how entrepreneurial mindsets are formed and sustained (Davey et al., 2016; Syed & Spicer, 2025). However, these dynamics remain under-examined in small-country innovation ecosystems, where close stakeholder proximity and limited scale create both advantages and constraints for entrepreneurial learning.

Addressing these gaps is particularly relevant for small-country HEIs such as MCAST in Malta, where innovation ecosystems depend on collaboration, agility, and internationalisation. The present study responds to these gaps by examining how a vocational HEI embedded in a small-state innovation system enacts its entrepreneurial mission through education, stakeholder engagement, and policy integration. Accordingly, the study is guided by the following research questions:

- RQ1. How effective is entrepreneurship education in fostering entrepreneurial competences and aligning them with small-economy labour-market needs?
- RQ2. How does entrepreneurship teaching support the development of entrepreneurial mindsets and reflect the institution's mission?
- RQ3. How do institutional support structures and environmental conditions influence students' entrepreneurial intentions and outcomes?

By addressing these questions, the study advances understanding of how vocational HEIs contribute to innovation ecosystems in small countries and how entrepreneurial transformation can be achieved through the interplay of education, policy, and stakeholder collaboration.

These questions provide the analytical framework for the subsequent methodological design and empirical analysis, which apply the Triple and Quadruple Helix perspectives to a vocational HEI operating within Malta's innovation ecosystem.

3 Methodology

3.1 *Research Design*

The study adopts a qualitative case study design to examine how an HEI in a small-country context enacts the characteristics of an entrepreneurial HEI. A single, in-depth case was selected to enable an exploratory and interpretive analysis of institutional practices, stakeholder perspectives, and contextual influences (Yin, 2018). The case study approach allows for contextual sensitivity and analytical depth in examining how entrepreneurship education, institutional support, and stakeholder collaboration interact to build competences, mindsets, and innovation capacity.

Multiple sources of evidence were integrated, including semi-structured interviews, a focus group, and document analysis, enabling methodological triangulation. The research questions identified in the literature review guided both data collection and interpretation.

3.2 *Reflexivity and Autoethnographic Component*

Given the involvement of institutional members in the research team, reflexivity was embedded throughout the study. A reflexive self-evaluation session with entrepreneurship lecturers, who were also part of the research team, was undertaken to capture practitioner insights into pedagogical practices and institutional culture. This autoethnographic element enabled educators to critically reflect on their professional experiences and on the evolution of entrepreneurship education at the institution, while explicitly acknowledging positionality and potential bias (Ellis et al., 2011).

Data collection and analysis were conducted within a multidisciplinary research team, combining insider knowledge of institutional dynamics with external academic perspectives. Although entrepreneurship lecturers participated in the research process, interviews with external stakeholders were conducted using a structured protocol and analysed collaboratively within the research team to minimise interpretive bias. This configuration enhanced analytical credibility while maintaining sensitivity to contextual nuances.

3.3 *Data Collection and Sources*

Data were collected between December 2024 and March 2025 through semi-structured interviews with MCAST management (two representatives), industry (one interviewee), and government (one interviewee), entrepreneurship lecturers (two), as well as a focus group with three former students of entrepreneurship modules. In total, the empirical dataset comprised six interviews and one focus group with three alumni participants. Participants were selected through purposeful sampling (Patton, 2015) to ensure diversity of perspectives within the institution and its external ecosystem.

Interviews explored perceptions of entrepreneurship education, institutional support mechanisms, and the relationship between pedagogical practices and ecosystem needs. The focus group provided retrospective reflections on student experiences and perceived impact.

Document analysis complemented the qualitative data. Institutional documents included the MCAST Act (2023), the Strategic Plan 2022–2027 (MCAST, 2022), and reports from three EU-funded projects: Higher Education Innovation Growth and Training: Heightening sustainable innovation in our HEIs and societies (HEIGHT); Transforming advanced water skilling through

the creation of a network of Extended Reality Water Emulative Centres (WATERLINE); and Fostering Entrepreneurial Mindsets through Challenge-Based Learning (EXCEL) (see Table 2 for details). Collectively, these projects trace the development of entrepreneurship education, ecosystem engagement, and institutional strategy. These documents provided empirical grounding for interpreting how the entrepreneurial mission is articulated in practice and aligned with national and European policy frameworks.

3.4 *Data Analysis Procedure*

Data were analysed using reflexive thematic analysis, following the six-phase framework proposed by Braun and Clarke (2006). One member of the research team led the coding and theme development. To ensure analytical rigour, the codes and themes were reviewed and discussed with the co-authors who are lecturers in entrepreneurship, and interpretations were refined through iterative dialogue.

In the first phase, transcripts were read repeatedly to achieve familiarisation with the dataset. Reflexive notes were recorded to capture initial interpretations and contextual observations. Initial codes were generated inductively and developed iteratively through close engagement with the data.

Codes were then clustered into candidate themes reflecting recurring patterns across stakeholder groups. These themes were examined in relation to the research questions and the Triple and Quadruple Helix frameworks guiding the study. Themes were reviewed against the full dataset to ensure internal coherence and distinctiveness, and some were merged or refined to better represent the empirical material. A thematic matrix was constructed to cross-reference themes with interviews, focus group data, lecturer reflections, and institutional documents, enhancing transparency and analytical traceability.

To strengthen contextual validity, an expert at MCAST, familiar with Malta's innovation ecosystem and institutional practices, reviewed the thematic structure and interpretations. Consistent with reflexive thematic analysis, the study prioritised interpretive depth and researcher reflexivity over statistical inter-coder reliability (Braun & Clarke, 2019).

3.5 *Ethical Considerations*

Ethical approval for the research was granted through MCAST's internal review mechanism prior to data collection. All participants provided informed consent, participation was voluntary, and anonymity was maintained in the reporting of results. Audio recordings and transcripts were securely stored and accessible only to the research team.

Special care was taken while managing the reflective self-evaluation sessions involving lecturers, given their dual role as educators and co-researchers. Discussions were conducted in a confidential setting and anonymised before integration into the analysis to ensure that reflections served as interpretive data rather than personal testimony, in accordance with ethical standards for reflexive qualitative research (Ellis et al., 2011).

3.6 *Research Team and Positionality*

The research team brought complementary expertise to the study. Two lecturers directly responsible for teaching entrepreneurship modules contributed practitioner perspectives and access to pedagogical contexts. Two project researchers engaged in multiple European innovation initiatives ensured continuity between institutional practice and EU-level frameworks. Two additional authors, external to MCAST but involved in the WATERLINE project, provided comparative insights and analytical independence.

This multi-positional configuration enabled a balanced analysis, combining insider understanding of institutional dynamics with external critique. The inclusion of practitioners as co-researchers aligns with autoethnographic principles that treat reflection on professional experience as a legitimate source of knowledge and collaborative inquiry.

3.7 *Methodological Considerations*

As in most qualitative case studies, the findings are context-specific and not intended for statistical generalisation. While the participation of institutional members enhanced contextual understanding, it also required careful management of potential bias. The involvement of external researchers, structured peer discussions, expert review, and the use of multiple data sources collectively enhanced the robustness, transparency, and credibility of the study's conclusions.

4 Results

This section presents the findings organised into a contextual framing of Malta's innovation ecosystem and three analytical themes.

4.1 *Context: Malta's Innovation Ecosystem*

This subsection outlines Malta's innovation performance and the contextual factors shaping its entrepreneurial ecosystem, drawing primarily on the European Innovation Scoreboard (EIS) 2025 (European Commission, 2025).

Malta is classified as a Moderate Innovator, reaching approximately 95% of the EU average performance. This marks one of the fastest improvement trajectories in the European Union, with a cumulative increase of 16.7 percentage points since 2018 and a gain of 7.6 points between 2024 and 2025. The report highlights steady progress across several dimensions of the innovation framework, particularly in intellectual property generation, employment in knowledge-intensive activities, and international cooperation. These trends indicate a maturing innovation ecosystem that, despite its small scale, demonstrates agility in adopting European frameworks and leveraging external partnerships to strengthen national innovation capacity.

Malta's strengths lie in its strategic positioning as a small, open economy that effectively translates policy incentives into entrepreneurial outcomes. Its strong performance in intellectual property, especially trademark applications, reflects a dynamic entrepreneurial culture. The country's integration into European research and innovation networks, notably through Horizon Europe and the EIT KICs, helps offset domestic constraints in R&D infrastructure while expanding access to advanced research capabilities. National initiatives promoting digitalisation, SME innovation, and skills development further reinforce this upward trajectory.

At the same time, the EIS 2025 underscores persistent structural challenges. Malta's limited domestic market, modest R&D investment, and dependence on foreign technology hinder its transition from a "Moderate Innovator" to a "Strong Innovator." The small size of its economy constrains economies of scale, institutional diversification, and the establishment of large research clusters. The report suggests that sustaining recent gains will require deeper collaboration among academia, industry, and government, alongside broader civil society participation to consolidate an inclusive, knowledge-based economy. This mirrors Georghiou et al. (2014), who note that small-state innovation systems benefit from proximity, trust, and policy agility but rely on external openness for access to knowledge, markets, and technology. Malta embodies this dual logic of proximity and openness: its compactness enhances coordination, while international linkages compensate for structural limitations. Within this ecosystem, MCAST operates as an entrepreneurial HEI mediating between local collaboration and international engagement.

4.2 *Entrepreneurial Competences and Labour-Market Alignment*

MCAST positions entrepreneurship as a transversal competence, embedding it across qualification levels 4 and 6 and disciplines rather than treating it as a specialised subject. This approach, confirmed by MCAST management,

ensures that all students are exposed to entrepreneurship modules focused on employability skills such as teamwork, communication, and adaptability (Management, interview).

Both alumni and industry representatives pointed out that, while students gain initiative and creativity, there are still gaps in presentation and interpersonal skills that require further development (Alumni, focus group; Industry, interview). The industry representative emphasised the importance of workplace readiness and communication skills, reinforcing the need for closer alignment between entrepreneurial training and labour-market expectations.

A recurring challenge identified by lecturers, students, and management is the lack of structured institutional support for sustaining student projects after coursework ends. The non-operational status of the MCAST Entrepreneurship Centre and the absence of resources for follow-up or business incubation support were cited as barriers to the continuation of promising ideas (Lecturers, reflection; Alumni, focus group; and Management interviews). These structural gaps limit the translation of competences into sustained entrepreneurial outcomes.

4.3 *Entrepreneurial Mindsets and Vocational Mission*

Alumni and lecturers consistently highlighted that experiential, project-based learning is central to developing entrepreneurial mindsets. Alumni described how pitching and teamwork exercises improved their confidence and ability to present ideas in professional settings, with one alumnus noting that teamwork during the entrepreneurship module mirrored real workplace dynamics (Alumni, focus group). Lecturers observed that student engagement increases when entrepreneurship is linked to real project work or industry challenges, making learning more relevant and motivating (Lecturers, reflection).

This experiential orientation aligns with MCAST's vocational mission, integrating entrepreneurship with applied, work-based learning. Project-based evidence from HEIght, WATERLINE, and the EXCEL Winter School, demonstrates measurable gains in transversal skills and shows how entrepreneurship education is embedded within real institutional and stakeholder collaboration contexts (Lecturers, reflection, and project documentation).

However, lecturers also noted that engagement varies by discipline, and that syllabus rigidity and limited time for applied projects can constrain deeper mindset formation (Lecturers, reflection). Rigid curricula and insufficient post-course support continue to limit the sustainability and further development of student-led entrepreneurial initiatives (Lecturers, reflection; Alumni, focus group; and Management, interviews).

4.4 *Institutional Support and Small-Country Context*

The third theme concerns how institutional frameworks and Malta's small-country conditions influence MCAST's entrepreneurial performance.

Institutional policy documents, the MCAST Act (2023) and the Strategic Plan 2022–2027 (MCAST, 2022), explicitly mandate entrepreneurship promotion and embed work-based learning across programmes, confirming its strategic institutional priority. The government official, a representative of Transport Malta, reinforced MCAST's national significance, describing it as “a key part of the national innovation strategy and essential for preparing future professionals”; adding that “entrepreneurial mindset training is important before students enter the workplace” (Government, interview). The industry representative agreed with this statement, emphasising that workplace readiness and communication skills should receive greater curricular attention.

The small-country context emerged in many accounts. Alumni frequently highlighted the limitations of Malta's domestic market, noting that because “Malta is small,” they and their peers must think globally from the outset (Alumnus, focus group). Lecturers and management also remarked that these constraints push students to design adaptable and internationally oriented projects.

Project evidence demonstrates how MCAST leverages international collaboration to mitigate scale limitations. The WATERLINE Project built Quadruple Helix partnerships around digital water education and innovation; the EXCEL Winter School expanded challenge-based mobility initiatives; and the ELEVATE exports MCAST's training model in design thinking, entrepreneurship, and pitching to Madeira and the Azores (Portugal), and La Réunion (France).² Management interviewees described these initiatives as evidence that Malta, despite its size, can contribute significant expertise to wider European networks.

Overall, institutional policies and external collaborations strongly support MCAST's entrepreneurial mission. While Malta's limited size constrains market expansion, it simultaneously promotes agility, close coordination, and international engagement, enabling MCAST to act both as a national anchor and a global knowledge partner in the country's innovation ecosystem.

An overview of the key findings across the three analytical themes is presented in Table 1, which consolidates evidence from interviews, focus groups, lecturers' reflections, and project documentation. The table shows briefly how each stakeholder group contributed to understanding entrepreneurial

² The countries participating in the ELEVATE project are The Netherlands, Malta, Portugal (Madeira and Azores), France (La Réunion).

TABLE 1 Thematic synthesis of stakeholder perspectives on entrepreneurship education at MCAST

Analytical theme	Key findings	Stakeholder perspective	Illustrative evidence	Interpretation
Entrepreneurial competences – labour-market alignment	Entrepreneurship embedded at Levels 4 and 6; builds confidence in teamwork and pitching; gaps in soft skills; projects strengthen competences.	Management; alumni; lecturers; industry.	<i>“Linked to real project work.” (Lecturer); “Graduates are proactive but need stronger presentation skills.” (Industry); “It’s very effective at developing the skills you need to home in on business aspects like financials, having to calculate expenses, rent costs, maintenance, and so on.” (Alumnus)</i>	Entrepreneurship education supports competence development through experiential learning closely linked to industry demands.
Entrepreneurial mindsets – vocational mission	Students are more engaged when solving real problems; rigid syllabus limits practice; lack of follow-up; entrepreneurship tied to employability.	Lecturers; alumni; management.	<i>“Students can see the relevance to their field or community challenges.” (Lecturer); “All these skills contribute to having individuals that are responsive to the economy, that we are providing individuals with the tools to be successful in their lives and working career, and this within a vocational and professional context.” (Management)</i>	The vocational mission reinforces the development of entrepreneurial mindsets oriented toward practical problem solving.

TABLE 1 Thematic synthesis of stakeholder perspectives (cont.)

Analytical theme	Key findings	Stakeholder perspective	Illustrative evidence	Interpretation
Institutional support – small-country context	MCAST central to innovation; need to improve institutional practices; Malta's scale demands international orientation; projects extend expertise abroad.	Government; industry; alumni; lecturers.	<i>"MCAST is key part of the national innovation strategy." (Government); "... students should be given enough of a perspective that if the market is then wider, they need to be prepared to operate at scale as well." (Industry); "Different institutes within MCAST approach entrepreneurship in varying ways, ... This diversity in perspectives requires adaptable teaching strategies to make entrepreneurship relevant to all fields." (Lecturer)</i>	The small-country context enables stronger ecosystem engagement and institutional support for entrepreneurial initiatives.

competences, mindsets, and the institutional conditions that shape MCAST's role within Malta's innovation ecosystem.

The patterns identified across stakeholder perspectives are reinforced by evidence from European-funded projects that have been integrated into MCAST's educational and institutional practices. These projects illustrate how the themes identified in Table 1 (entrepreneurial competences and labour-market alignment, entrepreneurial mindsets and vocational mission, and ecosystem engagement in a small-country context) are operationalised through collaborative learning activities and institutional partnerships. These initiatives further demonstrate how project-based collaboration complements the internal development of competences and mindsets described above.

Table 2 summarises the EU projects used for analysis and their contributions to the formation of entrepreneurial competences and mindsets within MCAST.

Together, the findings summarised in Tables 1 and 2 show that MCAST's entrepreneurial performance results from the intersection of institutional policy, pedagogical practice, ecosystem engagement, and international collaboration. Entrepreneurial competences are developed through experiential learning activities aligned with Malta's labour-market needs, while entrepreneurial mindsets are fostered through the institution's vocational mission and pedagogical practices. Participation in European-funded projects and collaboration with international partners further extend the institution's engagement with broader innovation networks. In the context of a small country such as Malta, these relationships become particularly visible, as close links between educational institutions, industry, public authorities, and international collaborators facilitate the integration of entrepreneurship education with regional innovation and development processes.

5 Discussion

5.1 *Framing MCAST within the Entrepreneurial HEI Paradigm*

The concept of the entrepreneurial university has progressively evolved from a model centred on research commercialisation to one encompassing broader societal engagement. Building on the Triple Helix and the Quadruple Helix, recent scholarship frames entrepreneurial HEIs as multi-stakeholder, mission-driven organisations that create public and private value simultaneously.

Within this emerging literature, Syed et al. (2023) argue that entrepreneurial HEIs represent a new stage in the evolution of higher education, characterised by diversification of institutional types, pedagogical innovation, and

TABLE 2 European-funded projects supporting entrepreneurship education and ecosystem engagement at MCAST

Project name and period	Objective	Approach to entrepreneurship	Funder	Partner countries
HEIGHT – Higher Education Innovation Growth and Training: Heightening sustainable innovation in our HEIs and societies (2021–2023)	To equip faculty and students with skills to innovate around sustainability and climate challenges.	Introduced challenge-based learning and innovation systems thinking inspired by the EIT Climate KIC Transitions Hub, fostering interdisciplinary problem-solving and entrepreneurial mindsets among students and lecturers.	EIT Climate KIC	Malta, United Kingdom, Cyprus, Türkiye
EXCEL – Fostering Entrepreneurial Mindsets through Challenge-Based Learning (2023–2024)	To strengthen MCAST's role in Malta's innovation ecosystem by engaging students in urban mobility innovation.	Promoted interdisciplinary collaboration and engagement with public-sector and industry stakeholders through challenge-based innovation projects.	EIT Urban Mobility	Malta

TABLE 2 European-funded projects supporting entrepreneurship education and ecosystem (cont.)

Project name and period	Objective	Approach to entrepreneurship	Funder	Partner countries
WATERLINE – Transforming Advanced Water Skilling through the Creation of a Network of Extended Reality Water Emulative Centres (2022–2025)	To develop a European Digital Water HEI Alliance that enhances research, innovation, and entrepreneurship capacities across partner HEIs.	Applied the Quadruple Helix model and introduced entrepreneurial training through blended learning (online modules and hackathons), promoting early-stage researchers’ entrepreneurial thinking.	Horizon Europe	Malta (coordinator), Czechia, Finland, Germany, Ireland, Italy, Norway, Serbia, The Netherlands, Türkiye, United Kingdom
ELEVATE – Empowering Island Students through Innovation and Entrepreneurship (2025)	To train island students in innovation and entrepreneurship through design thinking and pitching challenges.	Experiential and competition-based learning focused on real-world mobility solutions.	ERT Urban Mobility	The Netherlands, Malta, Portugal (Azores and Madeira), France (La Reunión)

engagement with complex socio-economic environments. MCAST illustrates this transformation. As Malta's leading vocational education and training institution, it extends the entrepreneurial university logic into applied and practice-oriented domains, where entrepreneurship is embedded in curricula, governance, and external partnerships rather than confined to business start-ups or technology transfer. This case therefore contributes to the literature by illustrating how entrepreneurial HEI dynamics can emerge within vocational institutions operating in small-country innovation systems, where proximity among stakeholders and international collaboration compensate for limited domestic scale.

MCAST's model demonstrates how an HEI can operate simultaneously through institutional coordination and broader societal engagement within helix-based innovation configurations, where central government, industry, civil society, municipalities, and community organisations participate in co-creation. The HEIght Project exemplified the Triple Helix by aligning curricula with labour-market and sustainability needs, while the WATERLINE Project embodied the Quadruple Helix through hackathons and citizen-driven problem-solving in digital water management. These initiatives show that entrepreneurship at MCAST focuses on economic and societal goals, fostering inclusion, environmental awareness, and community participation, dimensions consistent with Carayannis and Campbell's (2009) expanded innovation model.

From a theoretical standpoint, MCAST's case supports Guerrero and Urbano (2012) in arguing that the entrepreneurial mission of HEIs emerges through internal capabilities and external ecosystem alignment. Its statutory commitment under the MCAST Act (2023) and strategic embedding of entrepreneurship in the Strategic Plan 2022–2027 (MCAST, 2022) demonstrate how institutional design can enable an HEI to function as an entrepreneurial system in search of continuous improvement.

Furthermore, MCAST's international partnerships illustrate how small-country HEIs enact what Etzkowitz (2021) terms entrepreneurial internationalisation, a proactive participation in knowledge networks that amplifies local impact. Through ELEVATE, MCAST exports its expertise in entrepreneurial pedagogy to other island contexts, reinforcing Malta's role within transnational innovation ecosystems. This dual function, as national anchor and international bridge, positions MCAST squarely within the spectrum of entrepreneurial HEIs discussed by Syed et al. (2023).

5.2 *Entrepreneurial Competences and Market Alignment*

The findings, in line with Mutanda et al. (2018) and Nikitina et al. (2020), show that entrepreneurship education at MCAST strengthens both entrepreneurial intentions and employability when integrated into competence-based frameworks. Entrepreneurship is embedded as a key skill unit across disciplines and qualification levels, reflecting Lackéus (2015), who defines entrepreneurial competence as value creation through collaborative action, and Fayolle and Gailly (2015), who emphasize the importance of experiential pedagogy. Alumni and lecturers report that project-based and challenge-driven approaches, as seen in the HEIght and WATERLINE projects, foster soft skills such as teamwork, problem-solving, and communication. Industry feedback confirms that MCAST graduates are proactive and adaptable, though gaps remain in presentation and interpersonal skills.

These outcomes support Syed and Spicer's (2025) argument that stakeholder engagement is fundamental to entrepreneurial HEI development. By involving employers, government, and civil society in course design and assignments, MCAST aligns its pedagogy with the needs of Malta's SME-driven economy and national innovation policy (European Commission, 2025). However, a tension persists between competence acquisition and consolidation: while graduates gain confidence and initiative, the absence of ongoing mentorship or incubation limits the translation of learning into sustained entrepreneurial activity. As reflected in the non-operational status of the MCAST Entrepreneurship Centre identified in the Results section, structural follow-up mechanisms remain underdeveloped, constraining the continuity of promising student initiatives. Nikitina et al. (2020) similarly highlight the need for continuity structures in small economies. Recent initiatives, such as strengthening alumni networks and establishing innovation hubs, aim to address this gap.

5.3 *Entrepreneurial Mindsets and Experiential Learning*

The analysis of entrepreneurial mindsets at MCAST reveals that initiative, resilience, and opportunity recognition are most effectively developed through experiential learning and reflection, substantiating Fayolle and Gailly's (2015) view that entrepreneurship education is transformative when it engages students emotionally and practically. Lecturers note that students are more engaged when entrepreneurship is linked to real project work, echoing Lackéus (2015) on the importance of ownership and emotional investment. MCAST's project-based pedagogy, including collaborations with industry and community actors, and initiatives like the EXCEL Winter School, nurtures creativity and persistence, attributes that are valued by employers. This alignment between experiential pedagogy and MCAST's vocational mission reinforces its

positioning as a practice-oriented entrepreneurial HEI, where mindset formation is embedded in applied and work-based learning contexts.

Lecturers' reflexive self-evaluation, following Ellis et al. (2011), demonstrates how reflexivity enables educators to adapt teaching to local conditions and diverse student profiles, ensuring responsiveness to vocational realities. At the ecosystem level, engaging municipalities and citizen groups in projects like WATERLINE transforms students into active contributors to community innovation, aligning with Davey et al. (2016) on the societal role of HEIs. Nevertheless, constraints such as limited curricular flexibility and lack of structured follow-up for student initiatives persist, echoing Mutanda et al. (2018), who stress the need for supportive institutional culture and resources. Strengthening post-project support mechanisms, such as mentorship or incubation, would help translate mindset shifts into entrepreneurial action.

5.4 *Institutional Support, Stakeholder Networks, and the Small-Country Context*

The findings suggest that MCAST's effectiveness depends on both robust institutional frameworks and the collaborative density typical of small-country innovation systems. At the policy level, the MCAST Act (2023) and the Strategic Plan 2022–2027 (MCAST, 2022) formalise entrepreneurship as a core institutional mandate. This statutory anchoring reflects the institutionalisation stage and aligns with Syed and Spicer's (2025) stakeholder-centric model, in which HEI development is co-shaped by multiple actors' expectations and contributions. Government and industry interviews underscored this interdependence, emphasising MCAST's role in preparing graduates for innovation-driven sectors and addressing national skill shortages.

From a systemic perspective, Malta's scale reshapes how institutional coordination and entrepreneurial learning unfold. As Georghiou et al. (2014) explain, small-state innovation systems benefit from proximity, short coordination chains, and policy agility, facilitating the Triple and Quadruple Helix interactions discussed above. MCAST leverages this proximity through regular consultation with ministries, businesses, and community organisations, effectively acting as a convenor of Malta's innovation ecosystem.

However, alumni and lecturers noted that limited market scale constrains local entrepreneurial growth, prompting early internationalisation. As alumni accounts, the perception that "Malta is small" encourages students to think globally from the outset, transforming a structural limitation into an adaptive entrepreneurial orientation. MCAST's participation in European projects, particularly ELEVATE, represents a strategic response: using transnational

collaboration to expand learning opportunities and export pedagogical models. This demonstrates what Etzkowitz (2021) calls innovation diplomacy, whereby small institutions extend influence through international partnerships. It also reflects Syed and Spicer's (2025) assertion that stakeholder-oriented HEIs evolve by engaging diverse external actors beyond national boundaries.

Taken together, the three thematic dimensions discussed above reveal an interdependent model of entrepreneurial HEI development in a small-country context. Competence formation, mindset construction, and institutional anchoring operate not as isolated processes, but as mutually reinforcing mechanisms shaped by ecosystem proximity and international engagement. In essence, MCAST illustrates how an HEI can thrive within a small ecosystem by integrating institutional support, stakeholder engagement, and international collaboration. The interplay of Triple and Quadruple Helix relationships enables it to balance economic imperatives with societal missions, sustaining relevance in a resource-constrained context.

6 Conclusions

6.1 *Addressing the Research Questions*

The study addressed three interrelated questions: how entrepreneurship education builds competences and mindsets, how institutional structures support entrepreneurial development, and how small-country conditions shape entrepreneurial HEI performance.

In response to the first research question, the findings suggest that competence formation and mindset development at MCAST are primarily achieved through experiential, project-based pedagogy embedded within vocational programmes. Entrepreneurship is integrated as a transversal competence across qualification levels and disciplines, combining employability, innovation, and sustainability. Entrepreneurship education extends beyond business creation to cultivate teamwork, creativity, communication, and problem-solving, skills valued by employers and aligned with Malta's SME-based economy. Students gain confidence through experiential learning, while educators model entrepreneurial behaviour through reflective teaching practices.

However, persistent challenges remain, notably limited follow-up for student-led projects and curricular rigidity that restrict long-term entrepreneurial engagement. As highlighted in the Results, the non-operational status of the Entrepreneurship Centre illustrates this structural gap in post-course support. Strengthening institutional mechanisms for mentoring,

incubation, and small-scale funding could help sustain entrepreneurial activity beyond coursework and consolidate competence development into entrepreneurial action.

Regarding the second research question, institutional anchoring through statutory mandate, strategic planning, and stakeholder collaboration enables MCAST to integrate entrepreneurship into governance and curriculum design. National and institutional frameworks, including Malta's innovation strategy and the MCAST Act (2023), position MCAST as a mediator between policy and workforce development. Collaboration with government and industry bridges skills formation and innovation policy, reinforcing the alignment between vocational education and national development objectives.

In relation to the third research question, Malta's small-country context both constrains scale and stimulates agility. Limited domestic market size and modest R&D investment restrict scalability, yet proximity, dense stakeholder networks, and policy responsiveness facilitate coordination and rapid adaptation. International partnerships, exemplified by the WATERLINE, EXCEL, and ELEVATE projects, mitigate structural constraints by extending MCAST's reach beyond national boundaries, enabling the export of entrepreneurial pedagogical models and strengthening transnational learning networks. Taken together, the empirical analysis indicates that pedagogical practice, behavioural orientation, and institutional anchoring operate as mutually reinforcing dimensions of entrepreneurial HEI transformation in small-state systems.

6.2 *Theoretical Contributions*

The study advances theory by extending the entrepreneurial HEI framework into vocational and small-state contexts. It supports Syed et al. (2023) and Syed and Spicer (2025) in conceptualising entrepreneurial HEIs as adaptive, stakeholder-driven institutions that combine educational, social, and economic missions. By integrating Triple and Quadruple Helix perspectives, the study conceptualises entrepreneurship as a multidimensional process linking economic and societal value creation (Carayannis & Campbell, 2009). It further extends Syed and Spicer's (2025) stakeholder model by embedding community participation and civil-society engagement as integral dimensions of entrepreneurial ecosystems.

The findings contribute to the understanding of small-state innovation systems (Georghiou et al., 2014; Jucevičius et al., 2017; Suseno & Standing, 2017; European Commission, 2025), demonstrating how proximity and openness interact to sustain innovation. MCAST's dense stakeholder networks allow rapid policy translation and curriculum co-creation, while European

collaborations compensate for domestic R&D constraints. Comparable institutions in other small or island contexts, such as the University of the Azores, the University of Madeira, and La Réunion's Regional Innovation Agency involved in the ELEVATE project, adopt similar strategies of resource pooling and cross-regional learning. These cases reinforce the relevance of MCAST's dual strategy: local integration and international engagement as complementary pathways for strengthening innovation in small ecosystems.

6.3 *Policy Implications*

From a policy perspective, institutionalising entrepreneurship across curricula requires supportive governance, cross-faculty collaboration, and continuous professional development for educators in experiential methods. National agencies could enhance this process by establishing permanent support structures for student entrepreneurship, including incubators, mentoring programmes, and micro-grant or seed-funding schemes, to extend project lifecycles beyond coursework. Embedding such mechanisms within national innovation and local development plans would strengthen the contribution of vocational HEIs to sustainable growth. The findings suggest that vocational HEIs can act as strategic intermediaries within small-country innovation ecosystems, linking education, labour-market needs, and policy priorities through stakeholder collaboration. At the European level, participation in Horizon Europe and EIT KICs provides small HEIs with access to mentorship and shared infrastructures, transforming geographic smallness into strategic agility.

The entrepreneurial education and ecosystem engagement practices analysed in this study contribute directly to several SDGs: SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 10 (Reduced Inequalities). These findings suggest that entrepreneurial HEIs can act as levers for inclusive and sustainable innovation, particularly in small states where agility, cooperation, and reflexivity enable systemic transformation.

6.4 *Limitations and Future Research*

As a single-case qualitative study, the findings are context-specific rather than statistically generalisable. Reflexive safeguards, combined with triangulation and the inclusion of external researchers in the research team, mitigated potential bias. Future research should pursue comparative and longitudinal analyses to explore how entrepreneurial transformation evolves across vocational, applied, and research-intensive HEIs in other small or island systems. Studies involving peers in the Azores, Madeira, or Cyprus would

enhance understanding of how institutional design and scale interact with international collaboration. Quantitative approaches could also evaluate the long-term impacts of entrepreneurship education on career trajectories, innovation activity, and start-up creation, while further research into Quadruple Helix dynamics could clarify how civil society engagement strengthens institutional innovation.

In sum, this study demonstrates that entrepreneurial transformation is achievable even within resource-limited systems when institutions embrace stakeholder collaboration, reflective pedagogy, and strategic internationalisation. By integrating competence-based education, mindset development, and ecosystem partnership, vocational HEIs can serve as anchors of innovation and inclusion. MCAST illustrates how proximity and agility, rather than size, can become strategic advantages for building entrepreneurial capacity and advancing the broader mission of sustainable development envisioned by the Triple and Quadruple Helix models.

Research Funding

This study received funding from the following European Union projects: WATERLINE, Horizon Europe grant agreement No 101071306; EXCEL Winter School, EIT Urban Mobility grant agreement No 23675; and HEIght, EIT Climate KIC, grant agreement No 210291.

References

- Álvarez-Risco, A., Młodzianowska, S., García-Ibarra, V., Rosen, M., & Del-Aguila-Arcentales, S. (2021). Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: Case of Ecuador. *Sustainability*, 13(11), 6447. <https://doi.org/10.3390/su13116447>.
- Bacigalupo, M., Kamyliis, P., Punie, Y., & Van den Brande, G. (2016). *EntreComp: The entrepreneurship competence framework*. Publications Office of the European Union. <https://doi.org/10.2791/593884>.
- Bedő, Z., Erdős, K., & Pittaway, L. (2020). University-centred entrepreneurial ecosystems in resource-constrained contexts. *Journal of Small Business and Enterprise Development*, 27(7), 1149–1166. <https://doi.org/10.1108/jsbed-02-2020-0060>.
- Berács, J. (2014). Emerging entrepreneurial universities in university reforms: The moderating role of personalities and the social/economic environment. *Center for Educational Policy Studies Journal*, 4(2), 9–26. <https://doi.org/10.26529/cepsj.201>.

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>.
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>.
- Cao, Y., Liu, J., Yang, Y., Liu, X., Liu, Z., Lv, N., & Li, H. (2023). Construct a regional innovation ecosystem: A case study of the Beijing–Tianjin–Hebei region in China. *Sustainability*, 15(9), 7099. <https://doi.org/10.3390/su15097099>.
- Carayannis, E. G., & Campbell, D. F. J. (2009). “Mode 3” and “quadruple helix”: Toward a 21st-century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3–4), 201–234. <https://doi.org/10.1504/IJTM.2009.023374>.
- Caro-González, A. (2023). Towards a more inclusive triple transition and quadruple helix innovation ecosystems: The case of the Catalanian collaboration health and wellbeing within the INTEGER project. *Slovenský Národopis/Slovak Ethnology*, 71(3), 209–226. <https://doi.org/10.31577/sn.2023.3.21>.
- Davey, T., Hannon, P., & Penaluna, A. (2016). Entrepreneurship education and the role of universities in entrepreneurship. *Industry and Higher Education*, 30(3), 171–182. <https://doi.org/10.1177/0950422216656699>.
- Ellis, C., Adams, T. E., & Bochner, A. P. (2011). Autoethnography: An overview. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 12(1), 1–18. <https://doi.org/10.17169/fqs-12.1.1589>
- Etzkowitz, H., and Leydesdorff, L. (2000). The dynamics of innovation: From national systems and ‘Mode 2’ to a Triple Helix of university–industry–government relations. *Research Policy*, 29(2), 109–123. DOI 10.1016/S0048-7333(99)00055-4.
- Etzkowitz, H. (2021). *The triple helix: University–industry–government innovation and entrepreneurship* (2nd ed.). Routledge. <https://doi.org/10.4324/9780429350566>.
- European Commission. (2022). *A new European innovation agenda (COM(2022) 332 final)*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0332>.
- European Commission. (2024). Sustainable development in the European Union: Monitoring report on progress towards the SDGs (2024 edition). Publications Office of the European Union. <https://ec.europa.eu/eurostat/web/products-flagship-publications/w/KS-05-24-071>.
- European Commission. (2025). *European innovation scoreboard 2025: Country profile–Malta*. Publications Office of the European Union. https://ec.europa.eu/assets/rtd/eis/2025/ec_rtd_eis-country-profile-mt.pdf.
- Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management*, 53(1), 75–93. <https://doi.org/10.1111/jsbm.12065>.

- Georgiou, L., Uyarra, E., Scerri, S. R., Castillo, N., Harper, C., & Less, J. (2014). Adapting smart specialisation to a micro-economy: The case of Malta. *European Journal of Innovation Management*, 17(4), 428–447. <https://doi.org/10.1108/EJIM-03-2014-0026>.
- Guerrero, M., & Urbano, D. (2012). The development of an entrepreneurial university. *The Journal of Technology Transfer*, 37(1), 43–74. <https://doi.org/10.1007/s10961-010-9171-x>.
- Ierapetritis, D. G. (2019). Discussing the role of universities in fostering regional entrepreneurial ecosystems. *Economies*, 7(4), 119. <https://doi.org/10.3390/economies7040119>.
- Jucevičius, R., Juknevičienė, V., Mikolaitytė, J., & Šaparnienė, D. (2017). Assessing the regional innovation system's absorptive capacity: The approach of a smart region in a small country. *Systems*, 5(2), 27. <https://doi.org/10.3390/systems5020027>.
- Lackéus, M. (2015). *Entrepreneurship in education: What, why, when, how*. OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2015/10/entrepreneurship-in-education_c5ab9450/cccac96a-en.pdf.
- Malta College of Arts, Science, and Technology. (2023). *MCAST Act, 2023 (Act No. xxxii)*. Government of Malta. https://mcast.edu.mt/wp-content/uploads/MCAST_ACT_JULY_2023.pdf.
- Malta College of Arts, Science, and Technology. (2022). *Strategic plan 2022–2027: A community college for all*. https://www.mcast.edu.mt/wp-content/uploads/MCAST_StrategicPlan_2022-2027_17_11_final.pdf.
- Moraes, G. H. S. M., Iizuka, E. S., & Matheus, P. (2018). Effects of entrepreneurial characteristics and university environment on entrepreneurial intention. *Revista de Administração Contemporânea*, 22(1), 1–20. <https://doi.org/10.1590/1982-7849rac2018170133>.
- Mutanda, M., Lekhanya, L., & Moyo, S. (2018). The role of international academic professionals in the development of entrepreneurial universities in South Africa: Government-funded universities perspective. *Journal of Economics and Behavioral Studies*, 10(5(J)), 284–296. [https://doi.org/10.22610/jebbs.v10i5\(j\).2517](https://doi.org/10.22610/jebbs.v10i5(j).2517).
- Nikitina, T., Lapina, I., Ozolins, M., Irbe, M., Priem, M., Smits, M., & Nemilentsev, M. (2020). Competences for strengthening entrepreneurial capabilities in Europe. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(3), 62. <https://doi.org/10.3390/joitmc6030062>.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage.
- Su, Y., Zhu, Z., Chen, J., Jin, Y., Wang, T., Lin, C.-L., & Xu, D. (2021). Factors influencing entrepreneurial intention of university students in China: Integrating the perceived university support and theory of planned behavior. *Sustainability*, 13(8), 4519. <https://doi.org/10.3390/su13084519>.
- Suseno, Y., & Standing, C. (2017). The systems perspective of national innovation ecosystems. *Systems Research and Behavioral Science*, 35(3), 282–307. <https://doi.org/10.1002/sres.2494>.

- Syed, R.T. & Spicer, D. (2025). Entrepreneurial university development through the lens of stakeholders. Why? What? and How? *Journal of Innovation and Entrepreneurship*, 14, 36. <https://doi.org/10.1186/s13731-025-00500-0>.
- Syed, R. T., Singh, D., & Spicer, D. (2023). Entrepreneurial higher education institutions: Development of the research and future directions. *Higher Education Quarterly*, 77(1), 158–183. <https://doi.org/10.1111/hequ.12379>.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage.