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Developing an Entrepreneurial Ecosystem Framework for Student-Led Start-Ups in Higher Education

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Abstract

Higher education institutions (HEIs) are increasingly seen as central actors in entrepreneurial ecosystems, yet their support mechanisms do not always align with the needs of student entrepreneurs. This study investigates how key stakeholders, business students, professors, and experienced start-up founders perceive the relative importance of success factors for student-led start-ups within HEIs. Using a cross-sectional descriptive design, this study used a 34-item survey instrument developed through an extensive literature review and validated for content by a panel of experts. Triangulation between stakeholder groups enabled a multidimensional comparison of perspectives. Descriptive statistics were used to analyze patterns of agreement and variability, resulting in a three-tier framework of success factors based on perceived importance and consensus. High-impact factors included faculty entrepreneurial experience, student mindset, and access to mentorship, while traditional inputs such as infrastructure, legal support, and funding were ranked lower. The findings highlight a misalignment between institutional offerings and stakeholder priorities, highlighting the critical role of social and human capital. This research provides practical guidance for HEIs seeking to improve entrepreneurial support and contributes to theoretical discussions on stakeholder-informed ecosystem models. Although limited by its single-institution context, this study offers a foundation for future cross-institutional and longitudinal research.

Keywords: start-up success factors; student entrepreneurship; entrepreneurial learning; HEI start-up ecosystem

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1. Introduction

Higher education institutions (HEIs) have emerged as central actors in shaping entrepreneurial ecosystems, particularly by supporting student innovation and facilitating the creation of early-stage ventures. Drawing on the knowledge spillover theory of entrepreneurship, HEIs are increasingly recognized as catalysts of start-up activity, with their research output, teaching, and institutional networks serving as critical inputs to entrepreneurial development (Fritsch & Aamoucke, 2017). In response, many institutions have implemented initiatives such as incubators, accelerators, and entrepreneurial curricula to cultivate students' creativity, resilience, and problem-solving capacity (Bist, 2023; OECD/European Union, 2018; Paray & Kumar, 2020). These efforts increasingly emphasize experiential learning and interdisciplinary collaboration, aligning institutional strategies

with pedagogical innovations and broader educational missions (Gramm et al., 2024; Santoso et al., 2021). However, recent evaluations suggest that institutional mechanisms, such as incubators, often have limited impact on graduate entrepreneurship when implemented without strong integration with individual-level drivers (Guerrero et al., 2018).

Despite the growing commitment of HEIs to entrepreneurship, these interventions do not consistently produce successful outcomes. The effectiveness of institutional mechanisms depends not only on infrastructure or program design but also on alignment with individual-level factors, such as students' entrepreneurial intention, perceived behavioral control, and motivational readiness (Kakouris et al., 2023; Nabi et al., 2017). In particular, educational models that promote learning "through" entrepreneurship, those emphasizing action, reflection, and transformation are argued to be more effective in fostering entrepreneurial competence than purely theoretical or vocational modes (Kakouris & Liargovas, 2021). However, recent systematic reviews reveal that entrepreneurship education research often relies on narrow short-term outcome indicators and lacks consistency in pedagogical approaches, limiting its explanatory power for long-term entrepreneurial success (Nabi et al., 2017). As entrepreneurship is increasingly understood as a complex and multi-layered phenomenon, scholars have begun to shift focus from the mere availability of support to how different actors within the ecosystem perceive and evaluate the elements that contribute to start-up success. This shift is especially urgent given the persistently high failure rates among start-ups worldwide. Research estimates that up to 90% of new ventures fail, and even among those with early-stage funding, most do not advance beyond initial development (Bangdiwala et al., 2022; Kee et al., 2019). These outcomes raise critical questions about what truly drives entrepreneurial success, particularly in academic environments, where students often lack the professional experience, resources, and resilience of seasoned entrepreneurs and a comprehensive understanding of how institutional conditions, personal attributes, and contextual factors interact to shape entrepreneurial outcomes (Cantamessa et al., 2018; Pathania & Tanwar, 2024). In addition, broader ecosystem characteristics, such as transparency, policy coherence, and the ability of HEIs to support sustainability-oriented ventures, have been found to moderate start-up formation and collaboration patterns (Jirapong et al., 2021; Riaz et al., 2022).

Research has identified several internal and external factors that influence start-up performance in this context. Founder-related attributes such as knowledge, experience, motivation, and decision-making competence are consistently highlighted as key determinants of success (Aryadita et al., 2023). At the same time, external challenges, such as funding gaps, inadequate market positioning, and limited team capabilities, continue to pose major obstacles for start-ups (Goswami et al., 2023). A comprehensive review by Sevilla-Bernardo et al. (2022) identified a core group of success factors, including business model, leadership, team dynamics, and market orientation, as central to start-up performance. These findings affirm that success is not a singular concept but a composite of various interacting dimensions.

In this study, we, therefore, draw on two foundational concepts, (i) start-up and (ii) start-up success, to frame our investigation. A start-up is typically understood as a young, small, and innovation-driven enterprise oriented toward experimentation, problem solving, and scalable growth (Sevilla-Bernardo et al., 2022). However, it is also increasingly viewed as a performative and socioeconomic construct, shaped by entrepreneurial practices and institutional discourse (Cockayne, 2019). Similarly, start-up success cannot be fully captured by financial metrics alone. While indicators such as revenue or investment remain important (Díaz-Santamaría & Bulchand-Gidumal, 2021), broader definitions also include team cohesion, founder satisfaction, and long-term value creation (Kee & Rahman,

2020). This study adopts a multidimensional understanding of success, consistent with contemporary perspectives on entrepreneurial performance and sustainability.

Despite growing academic attention to these themes, most empirical research examines success factors from a single perspective, typically institutional or individual, without systematically comparing how different actors within academic entrepreneurship ecosystems assess their importance. Although resources such as incubators and funding programs are often prioritized, little is known about how these elements are comparatively valued by key stakeholders, including professors, students, and experienced founders. As a result, a lack of data-driven and stakeholder-informed frameworks that reflect the practical realities of supporting student-led start-ups in higher education remains.

To address this gap, the present study aims to develop an entrepreneurial ecosystem framework tailored explicitly to student-led start-ups in higher education institutions (HEIs). Drawing on comparative survey data from business school professors, experienced start-up founders, and business students in Lithuania, this study identifies and prioritizes the institutional, personal, and contextual factors perceived as most influential to student-led start-up success. By triangulating these stakeholder perspectives, the research contributes a novel, empirically grounded framework to inform more targeted and effective entrepreneurship support strategies within academic environments.

This paper is organized as follows. Section 2 presents the theoretical background on the key institutional, individual and contextual factors that influence student-led start-up success within higher education institutions; Section 3 outlines the research methodology; Section 4 presents the survey results and comparative analysis; Section 5 discusses the findings and proposes a framework based on insights from professors, founders, and students; and the final section concludes with recommendations for future research.

2. Theoretical Background

The entrepreneurial involvement of students has become a focal point of scholarly and policy interest due to its potential to foster innovation, regional development, and graduate employability. However, launching a successful start-up within the context of higher education remains a highly challenging endeavor. Student entrepreneurs typically face a wide range of barriers, including limited access to capital, weak networks, insufficient real-world experience, and gaps in entrepreneurial knowledge and competencies (Morris et al., 2017). A lack of institutional alignment between theoretical instruction and the demands of venture creation often compounds these limitations.

Although higher education institutions increasingly invest in entrepreneurial infrastructure and education, they are still frequently perceived as environments better suited to academic learning than to the practicalities of business development. This disconnect may inhibit the cultivation of essential entrepreneurial traits, such as opportunity recognition, adaptability, and risk tolerance, competencies that are vital for navigating the ambiguity and volatility of start-up environments. Over the past decade, research has expanded to examine how institutional offerings (e.g., entrepreneurship programs, incubators), personal attributes (e.g., entrepreneurial intentions, prior experience), and contextual resources (e.g., mentorship, funding, alum networks) collectively influence student entrepreneurial outcomes. Although the literature offers a wide spectrum of insights into the factors that foster student entrepreneurship, it often addresses these variables in isolation. However, these elements function as interdependent components of a broader entrepreneurial ecosystem within higher education institutions (HEIs), where institutional structures, individual attributes, and contextual resources collectively shape the success of student-led start-ups. Moreover, recent systematic reviews have emphasized the need for more integrative,

multidimensional, and stakeholder-sensitive approaches to evaluating entrepreneurship education and its outcomes (Nabi et al., 2017).

To conceptually frame these elements, this study adopts the perspective of the entrepreneurial ecosystem adapted for higher education contexts (Correia et al., 2024; Malecki, 2018; Stam, 2015). Within this framework, start-up outcomes are viewed as the result of interactions between institutional conditions (e.g., curricula, support programs), individual attributes (e.g., mindset, motivation), and enabling contextual factors (e.g., mentorship, funding, networks). This systems-based perspective is particularly relevant in HEIs, where student entrepreneurship is embedded in complex organizational structures and influenced by multiple stakeholders. Furthermore, this study draws on the concept of entrepreneurial capital, which encompasses the cognitive, social, and institutional resources available to student entrepreneurs (Keen & Etemad, 2011; Paray & Kumar, 2020). Entrepreneurial capital is closely related to institutional embeddedness, which refers to the degree to which academic infrastructure, norms, and actor networks shape entrepreneurial behavior (Guerrero & Urbano, 2012). Taken together, these theoretical foundations provide a coherent basis for the multidimensional, stakeholder-informed analysis of student-led start-up success in higher education institutions (HEIs). Against this backdrop, Table 1 summarizes the most frequently cited success factors in the literature relevant to student-led start-ups in HEIs, serving as a foundation for evaluating how different stakeholders assess their relative importance. These factors were identified through a targeted literature synthesis focusing on peer-reviewed studies and systematic reviews published within the past decade. The selection criteria included both the frequency of citation across multiple high-quality sources and the relevance of each factor to the institutional, individual, and contextual dimensions of student-led entrepreneurship in HEIs.

Table 1. Factors influencing student start-up success.

Success Factors	Description	Author(s), Date
Formal educational programs	Business and entrepreneurship curricula improve students' conceptual and operational understanding of start-up development	(Breznitz & Zhang, 2019; Hahn et al., 2017; Kassim et al., 2024; Wang et al., 2021; Zichella & Reichstein, 2023)
Technological skills	Integrating digital competencies into entrepreneurship education enhances students' ability to innovate and leverage technology	(Ahn et al., 2022; Haneberg & Aaboen, 2020; Rodrigues et al., 2021)
Entrepreneurial mindset and personal traits	Psychological traits such as risk tolerance, openness to failure, and motivation shape entrepreneurial intention	(Hägg & Kurczewska, 2021; Kitsios et al., 2021; Van Gelderen, 2023; Zichella & Reichstein, 2023)
Supporting mechanism	Access to pre-accelerators, incubators, and accelerators provides experiential learning, mentoring, and networks	(Lo & Theodoraki, 2021; Lyken-Segosebe et al., 2020; Miliou & Ioannou, 2024; Morris et al., 2017; Vardhan & Mahato, 2022)
Alumni	Alumni clubs and mentorship structures can offer early-stage support and industry-specific insights	(El-Awad et al., 2024; Landoni et al., 2021; Wraae et al., 2022; Wright et al., 2017)
The professor's previous experience in business	Professors with entrepreneurial backgrounds can influence students' intention and confidence through role modeling	(Boldureanu et al., 2020; San-Martín et al., 2021; Wraae et al., 2022)
Funding	Access to HEIs or external seed funding significantly enhances students' ability to test and scale business ideas	(Klyver & Schenkel, 2013; Morris et al., 2017; Mueller, 2023; Shirokova et al., 2018)

Formal Educational Programs. Structured academic programs in entrepreneurship have been shown to increase students' readiness to participate in venture creation by improving their understanding of entrepreneurial processes and market dynamics (Breznitz & Zhang, 2019; Kassim et al., 2024). These programs often foster entrepreneurial intention through cognitive, behavioral, and attitudinal development.

Technological Skills. While formal education provides the conceptual foundation for entrepreneurship, technological competencies equip students with the practical capabilities necessary for innovation. These include digital literacy, coding, data analysis, and prototyping skills, which extend beyond standard curriculum content and are increasingly essential for navigating technology-driven markets. As Haneberg and Aaboen (2020) argue, digital literacy and data competencies are increasingly viewed as prerequisites for the development of competitive start-ups.

Entrepreneurial Mindset and Personal Traits. Traits such as resilience, emotional intelligence, and openness to risk are widely acknowledged as predictors of entrepreneurial behavior (Kitsios et al., 2021; Zichella & Reichstein, 2023). These attributes shape students' perceptions of feasibility and desirability, thus influencing both intention and action.

Supporting Mechanisms. Institutions that offer structured support mechanisms, such as incubators and accelerators, provide not only physical resources but also mentorship, social capital, and a platform for iterative learning (Lo & Theodoraki, 2021; Miliou & Ioannou, 2024). However, the effectiveness of these mechanisms depends heavily on their alignment with the needs and readiness of students.

Alumni. Entrepreneurial alumni can act as role models and informal mentors, providing industry-specific knowledge, social capital, and motivational support. Their involvement can be particularly helpful during the early and most uncertain stages of venture development (Landoni et al., 2021).

Professors' Prior Entrepreneurial Experience. Professors with real-world entrepreneurial experience can increase student entrepreneurial confidence and intention. Their guidance can bridge the gap between theory and practice, particularly when integrated into classroom instruction or mentorship (Wraae et al., 2022).

Funding. Financial support, in the form of grants, competitions, or seed funding, remains a critical enabler for moving from idea to implementation. However, Morris et al. (2017) caution that without adequate guidance, financial support alone may not guarantee long-term success.

3. Materials and Methods

This study adopts a descriptive research design to develop a stakeholder-informed framework of success factors for student-led start-ups in HEIs. By systematically comparing the perspectives of business students, entrepreneurship professors, and experienced start-up founders, this study addresses the need for empirically grounded models that reflect how institutional, personal, and contextual factors are differentially valued within academic entrepreneurial ecosystems.

3.1. Research Design

This study employed a single-institution case study design using a cross-sectional descriptive approach to examine how different stakeholder groups perceive the relative importance of success factors for student-led start-ups in HEIs. The selected case, a Lithuanian higher education institution with an established entrepreneurship curriculum, offered a well-bounded and information-rich setting for exploring stakeholder perspectives within a real-world academic ecosystem. This institution was purposefully chosen due to its accessibility to the three target stakeholder groups (students, professors, and founders), its

ongoing strategic initiatives in student-led innovation, and its relevance as a representative example of an HEI actively engaged in entrepreneurship education. These characteristics made it a theoretically and practically appropriate case for generating exploratory insights and stakeholder comparisons within a higher education entrepreneurial ecosystem. Drawing from an extensive review of the literature, 34 original statements were developed to capture the success factors of start-ups. Rather than adopting existing instruments, this study developed a set of statements based on the theoretical foundations outlined above. This approach ensured conceptual alignment with the multidimensional focus of the research and supported the triangulated analysis of perspectives across stakeholder groups. To ensure relevance and clarity, all items were subjected to expert-based content validation. These validated statements formed the basis of a structured survey administered to students, professors, and experienced founders. The design enabled a comparative, stakeholder-informed analysis using descriptive statistics to capture both consensus and divergence across the groups.

3.2. Sample

This study employed a two-stage sampling strategy, encompassing both an expert panel for content validation and three stakeholder groups for the quantitative survey. A purposive sampling strategy was employed for all three respondent groups, selecting participants based on predefined eligibility criteria relevant to the study's aims.

In the first stage, content validity was assessed by a panel of 10 experts in entrepreneurship, business education, and start-up development. This panel composition was consistent with established methodological guidelines, which suggest involving between five and ten experts to ensure adequate breadth of expertise while maintaining analytical manageability (Roebianto et al., 2023; Wagner et al., 2010). Experts were purposefully selected using a criterion-based approach: all held doctoral or equivalent qualifications in relevant fields, had authored peer-reviewed publications in entrepreneurship education, and possessed applied experience in business development, start-up mentorship, or innovation ecosystems. Most of the panelists were affiliated with higher education institutions or innovation agencies. They were invited through professional networks and academic affiliations, ensuring access to knowledgeable and experienced evaluators capable of providing informed feedback on item relevance and clarity. This expert panel provided a robust foundation for establishing the instrument's content validity. Feedback from the panel was incorporated to refine and clarify the survey items, thereby strengthening the relevance of the instrument and construct validity. As argued (Libby & Blashfield, 1978), involving ten qualified experts yields an estimated 95% reliability rate in evaluative judgments, offering a strong foundation for content validation in education-related research.

In the second stage, the validated survey was administered within a Lithuanian higher education institution to a targeted sample comprising business students (n = 148), higher education professors (n = 10), and experienced start-up founders (n = 10). The student population consisted of individuals enrolled in higher education programs in business and entrepreneurship, making them a theoretically informed population with potential for future start-up activity. Students were eligible if they had completed at least one course in entrepreneurship or participated in related extracurricular activities, such as start-up competitions or innovation projects. The academic staff group included professors with 5 to 30 years of teaching experience in business, management, or entrepreneurship-related disciplines. Additional preference was given to those with direct entrepreneurial experience or practical involvement in student start-up initiatives. Eight out of ten reported prior experience running a business, and two had previously held CEO positions. The third group consisted of experienced start-up founders who were selected based on their

proven entrepreneurial track record, operational knowledge, entrepreneurial achievements, and insight into early-stage venture formation. Eligibility required a minimum of ten years of experience in start-up environments, demonstrated by either founding a revenue-generating company or securing external investment. All participants in this group had over 10 years of experience in entrepreneurship, were over the age of 30, and either had sustained revenue-generating ventures or had secured external investment. All participants were identified through faculty networks, institutional affiliations, entrepreneurship centers, and alumni connections from the case institution, which facilitated targeted outreach to qualified respondents.

The inclusion of students, professors, and founders provided complementary academic, experiential, and aspirational perspectives, enabling a robust and multidimensional analysis of how key success factors are perceived within HEIs and how institutional support aligns with stakeholder needs and real-world entrepreneurial dynamics.

3.3. Instrument Validation

The instrument development process followed established procedures for ensuring content validity in survey-based research (Almanasreh et al., 2019; Polit et al., 2007). The initial pool of 48 survey items was developed based on the multidimensional theoretical framework presented in Section 2, incorporating institutional, personal, and contextual factors associated with student-led start-up success in higher education.

A 10-expert panel in entrepreneurship and higher education was recruited to assess the preliminary instrument. Experts were asked to evaluate each item across two dimensions: relevance and clarity. A 5-point Likert scale was used for rating, which is widely applied in educational and social research for its ease of interpretation and adequate discriminatory power (Kusmaryono et al., 2022; Mumu et al., 2022), with 1 representing "not at all relevant/clear" and 5 indicating "highly relevant/clear". This dual-dimension evaluation ensured that the statements were conceptually accurate and understandable for the survey respondents. To quantify the level of expert agreement, a Content Validity Index (CVI) was calculated for each item. The CVI is widely used as a robust measure for assessing the relevance and clarity of questionnaire items, relying on expert panel ratings to evaluate and refine instruments (Siddiqui et al., 2024; Singh et al., 2021; Thomson et al., 2022). Items with a CVI of 0.78 or higher were retained, following the threshold proposed by Polit et al. (2007). Items falling below this threshold were removed based on expert feedback to enhance the instrument's content validity.

The result was a refined set of 34 validated statements for use in the primary survey (see Appendix A, Table A1). These items were systematically derived from the thematic clusters identified in the literature synthesis and are firmly anchored in the scholarly foundations outlined in Section 2. Each item was explicitly linked to one or more established academic sources to ensure both theoretical coherence and empirical relevance, thereby reinforcing the construct validity of the questionnaire and its alignment with current research in entrepreneurship and higher education.

The finalized instrument employed a 5-point Likert scale for participant responses, ranging from 1 ("strongly disagree"), 2 ("disagree"), 3 ("neutral"), 4 ("agree"), to 5 ("strongly agree"). This scale is widely applied in educational and social research for its effectiveness in translating subjective perceptions into quantifiable data while allowing nuanced expression of opinion (Boone & Boone, 2012). Its ordinal structure enables meaningful statistical analysis and supports both descriptive and comparative evaluation across stakeholder groups. The scale format aligned with established practices in entrepreneurship and education research, ensuring clarity of interpretation and consistency across survey items.

3.4. Data Collection

The data collection process was conducted in two sequential phases. First, the content validation of the survey instrument was carried out in January and February 2025 through an expert panel review, as detailed in Sections 3.2 and 3.3. Following validation, the finalized questionnaire was administered between March and May 2025 via an online survey administered through Google Forms, which ensured secure and anonymous participation. The final questionnaire consisted of 34 closed-ended Likert-scale items developed from the validated instrument, along with one optional open-ended question designed to gather additional information. The survey link was distributed by email to a targeted sample comprising the three stakeholder groups. Specifically, 356 invitations were sent to business students, 25 to professors, and 36 to experienced founders of start-ups. Each invitation included a brief overview of the aim of the study, assurance of confidentiality, and a statement confirming that participation was voluntary and anonymous. Participants were informed that completing the survey implied their consent to participate in the study. No personal identifiers were collected at any stage, and all responses were used solely for academic research purposes. The distribution strategy was designed to maximize the reach within each group while maintaining ethical standards.

3.5. Data Analysis

Data analysis was conducted using descriptive statistical techniques to examine how different stakeholder groups evaluated the relative importance of 34 previously expert-validated statements of start-up success factors. The analysis aimed to identify patterns of agreement and disagreement between stakeholder perspectives, as well as the level of variability in responses. The primary indicators used in the analysis included measures of central tendency (mean, median, and mode) and dispersion (standard deviation, variance, and range). These statistics were calculated separately for each statement and each stakeholder group. This approach enabled both within-group and cross-group comparisons, offering a comprehensive view of consensus and divergence in perceptions.

To identify the most and least important success factors, statements were ranked based on their mean agreement scores across all three groups. The five statements with the highest overall means were interpreted as receiving the strongest agreement, while the five lowest-ranked statements indicated lower perceived importance across groups. To complement this, the degree of stakeholder consensus was evaluated using standard deviation scores. Lower standard deviations indicated greater agreement within each group, while higher values pointed to divergent opinions. The five statements with the lowest and highest standard deviation scores were extracted to represent areas of consensus and contention. In a final step, mean scores and standard deviation values were visualized across all 34 items using comparative line graphs. These visual patterns were used to interpret stakeholder alignment and divergence, providing additional interpretive depth beyond numerical outputs and enabling a direct cross-group comparison of perceptions. The decision to focus on the top and bottom five statements in each category reflects methodological principles in mixed-methods survey research (Creswell, 2014; Yin, 2014). This tiered approach facilitated the development of a stakeholder-informed framework, which is discussed in Section 5.

3.6. Ethical Considerations

This study was conducted according to the highest ethical standards, adhering to the principles outlined in the Declaration of Helsinki, and received formal approval from the Institutional Review Board of the Faculty of Public Governance and Business/Business and Economics Institute (protocol code: P-PD-22-119/MRU, date of approval: 4 Novem-

ber 2024). All data were handled in strict compliance with the European General Data Protection Regulation (GDPR) and used exclusively for academic research purposes.

During the expert validation phase, all panel members were invited via direct communication and agreed to participate voluntarily. Prior to participation, each expert received a standardized briefing document outlining the aims of this study, the nature of their involvement, the academic purpose of their feedback, and all relevant ethical information. This included clear statements about their right to withdraw at any time without consequence, the voluntary nature of their participation, and assurances that their responses would not be personally attributed in any form. Informed consent was obtained in writing via affirmative email confirmation before any data collection began. While email correspondence inherently included identifying information for the purpose of consent, no such identifiers were linked to the expert responses during data analysis or reporting. All expert responses were treated with strict confidentiality, and no identifying information was recorded, ensuring anonymity and minimizing potential bias.

In the quantitative survey phase, participants (students, professors, and start-up founders) were informed through a standardized preamble at the beginning of the online questionnaire. This preamble clearly stated the purpose of the study, emphasized the voluntary nature of participation, and outlined the right to decline or withdraw at any point without consequence. It assured participants that the survey was fully anonymous, that no personal identifiers would be collected, and that their responses would be used solely for academic research purposes. The preamble also noted that there were no foreseeable risks associated with participation. Informed consent was considered obtained through the act of completing and submitting the questionnaire. All data were collected and processed in accordance with the European General Data Protection Regulation (GDPR), and responses remained strictly confidential.

4. Results

4.1. Analysis of Statements Based on Agreement Scores

This sub-section presents the descriptive results of the survey based on agreement scores across the three stakeholder groups: students, professors, and experienced start-up founders. These scores reflect the perceived relative importance of specific factors in fostering the successful development of student-led start-ups within the higher education context. Table 2 presents the top five statements that received the highest average scores across all three stakeholder groups: students, professors, and experienced start-up founders.

Table 2. Statements with the highest agreement among students, professors, and founders.

No. of Statement	Statement	Mean Score
6	Professors with prior entrepreneurial or business experience are seen as key enablers of successful student start-up development	2.67
18	Connecting with experienced entrepreneurs through networking opportunities can enhance the development of student-led start-ups	2.65
29	Confidence in one's abilities strengthens perseverance and plays a fundamental role in achieving success in student-run start-ups	2.64
28	Viewing failure as a learning opportunity and maintaining a growth-oriented mindset are essential elements in the development of student-driven start-ups	2.61
8	Supportive academic staff guide students' entrepreneurial efforts by embedding mentorship, resources, and encouragement within the learning process, helping transform ideas into viable start-up initiatives	2.56

The top-rated statement (No. 6) emphasized the role of professors' prior entrepreneurial experience in fostering the success of student-led start-ups, achieving the highest mean agreement score of 2.67. The second-highest-rated item (No. 18) concerned the value of networking opportunities with experienced entrepreneurs (mean score = 2.65). Statement No. 29, focusing on self-confidence as a driver of determination, ranked third (2.64), closely followed by a statement on positive attitudes toward failure (No. 28, 2.61). The fifth most agreed-upon statement (No. 8, 2.56) addressed the importance of supportive faculty and staff in nurturing entrepreneurial activities.

Table 3 presents the statements with the lowest agreement scores, indicating a relatively lower level of influence or greater challenges in the context of student-run start-ups, as assessed by various stakeholders.

Table 3. Statements with the lowest agreement among students, professors, and founders.

No. of Statement	Statement	Mean Score
4	The field of study is perceived to influence start-up success, with non-business students considered to be at a relative disadvantage compared to those in business-related disciplines	1.64
32	Direct investment by HEIs in student-run start-ups can catalyze and encourage the emergence of more such entrepreneurial ventures.	2.20
22	Access to legal and regulatory support, such as trademarking, patenting, and business registration, can support the creation and growth of student ventures within HEIs	2.28
34	Project-based funding, whether from national or EU projects, as well as grants, can catalyze and encourage the emergence of more student-run entrepreneurial ventures	2.30
21	HEI memberships in diverse networks, such as business angels' associations, can provide valuable resources and connections, further facilitating the growth of student-run start-up ventures.	2.32

The lowest score for the perceived influence of start-up success is attributed to the notion that non-business students have a lower chance of creating a successful start-up (Statement No. 4, 1.64). Other low-rated items included direct HEI investment in student ventures (No. 32, 2.20), legal and regulatory support (No. 22, 2.28), project-based public funding (No. 34, 2.30), and HEI membership in external networks such as business angel associations (No. 21, 2.32).

These results offer a descriptive overview of the factors that received the highest and lowest levels of agreement across stakeholder groups, highlighting which elements are most consistently valued within the academic entrepreneurial ecosystem. However, agreement scores alone do not capture the degree of consensus or divergence in perceptions. To further explore the extent of variability in stakeholder responses, the next section presents an analysis based on standard deviation values.

4.2. Analysis of Statements Based on Standard Deviation

This sub-section presents the descriptive analysis of variability in responses across the three stakeholder groups, based on the standard deviation scores for each of the 34 statements. Higher standard deviation values indicate greater divergence in stakeholder perspectives, whereas lower values suggest stronger consensus. Table 4 presents the five statements with the lowest standard deviation, suggesting a higher level of agreement among the stakeholder groups on these items.

Table 4. Statements with the lowest standard deviation among students, professors, and founders.

No. of Statement	Statement	Mean Score
16	Workshops at higher educational institutions can foster the creation of student-run start-ups	2.10
6	Professors with prior entrepreneurial or business experience are seen as key enablers of successful student start-up development	2.12
8	Supportive academic staff guide students' entrepreneurial efforts by embedding mentorship, resources, and encouragement within the learning process, helping transform ideas into viable start-up initiatives	2.18
11	Accelerator programs tailored to student needs can play a key role in advancing their entrepreneurial initiatives	2.20
5	Access to the latest technologies on campus can significantly enhance the potential for start-up success	2.21

The lowest standard deviation was recorded for Statement No. 16, which addresses the role of workshops in fostering student start-ups. Other items with relatively low variability include the role of professors' entrepreneurial experience (No. 6), faculty and staff support (No. 8), accelerator programs (No. 11), and access to technology on campus (No. 5). These findings reflect stronger consensus across groups regarding the importance of certain support mechanisms and institutional practices within HEIs. In contrast, Table 5 displays the five statements with the highest standard deviation values, reflecting the greatest variability in agreement among the surveyed groups.

Table 5. Statements with the highest standard deviation among students, professors, and founders.

No. of Statement	Statement	Mean Score
4	The field of study is perceived to influence start-up success, with non-business students considered to be at a relative disadvantage compared to those in business-related disciplines	3.69
23	Allocating dedicated spaces and facilities (e.g., labs, innovation corners, coworking hubs) can meaningfully contribute to students' start-up activities and development efforts	3.36
26	Embracing risk tolerance, fueled by ambition and a readiness to tackle challenges, is fundamental for budding entrepreneurs, as these traits often dictate the trajectory and resilience of their start-up journeys	3.14
27	Actively embracing challenges outside one's academic comfort zone can serve as a driving force in advancing student-led entrepreneurial initiatives	3.12
20	Networking with entrepreneurial alumni can encourage student-run start-up development	3.01

The statement with the highest standard deviation (No. 4) pertains to the perceived influence of a student's field of study on start-up success, indicating substantial variation in opinion. Statements relating to dedicated physical space (No. 23) and personal traits, such as risk tolerance and ambition (No. 26), stepping outside one's comfort zone (No. 27), and networking with entrepreneurial alumni (No. 20), also showed notable variability. These items reveal a broader spectrum of opinions, potentially shaped by different professional roles, experiential exposure, and levels of engagement with student entrepreneurship.

The analysis of statements based on standard deviation highlights which factors are broadly endorsed across stakeholders and which elicit more polarized views. This

differentiation provides a foundation for deeper comparative analysis in the next section, which examines cross-group patterns of convergence and divergence in greater detail.

4.3. Comparative Analysis Among Three Different Groups

This sub-section presents a comparative analysis of the responses provided by students, professors, and experienced start-up founders across all 34 statements included in the survey. Figure 1 illustrates the average agreement scores for each stakeholder group, allowing a visual comparison of trends, points of convergence, and divergence in their perceptions of key success factors for student-led start-ups.

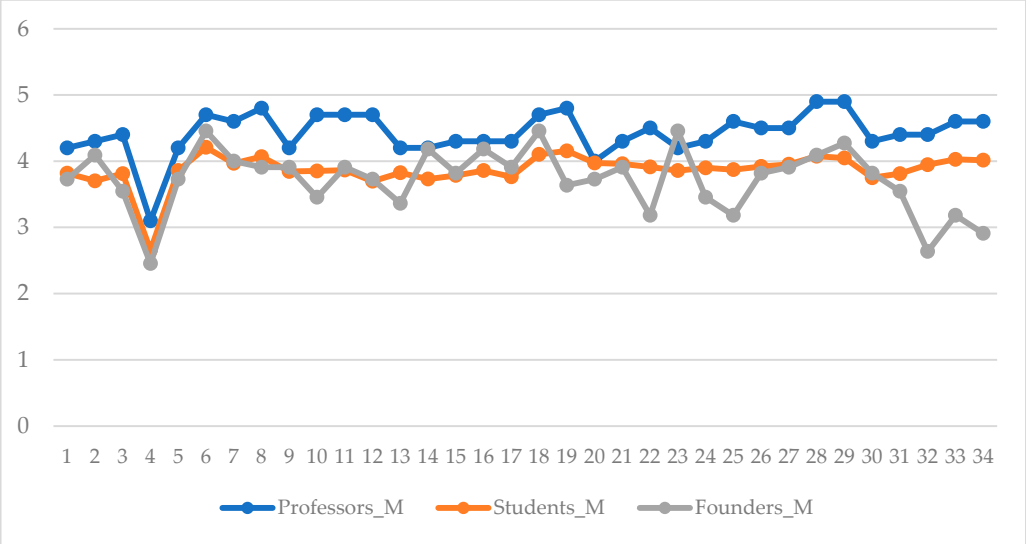


Figure 1. Comparative analysis of stakeholder opinions on entrepreneurship and start-up development in HEIs.

As shown in Figure 1, professors consistently assigned higher average scores across most statements, indicating stronger agreement with the listed success factors. This pattern suggests a generally optimistic or supportive stance toward institutional and individual enablers of entrepreneurship. Students tended to occupy a middle ground, expressing moderate agreement overall. Founders exhibited the broadest range in their responses, with their mean scores fluctuating more significantly across items, which reflects a more varied or critical assessment of start-up success conditions.

A particularly sharp divergence in responses can be observed for Statement No. 4, concerning the perceived disadvantage of non-business students in launching successful start-ups. All three groups rated this item lower compared to others, with a notable dip in agreement that reflects shared skepticism about the claim. This convergence aligns with broader shifts in entrepreneurial discourse, which value interdisciplinary backgrounds. In addition to mean score comparisons, Figure 2 presents the standard deviations of responses for each group, providing insight into internal consensus or variability within each stakeholder.

Professors demonstrated the lowest standard deviation values overall, indicating a relatively high level of internal agreement. Students showed moderate variation, suggesting some diversity in views, likely due to differences in experience and exposure. Founders displayed the highest degree of variability, with several peaks exceeding a standard deviation of 1.5. This pattern suggests greater heterogeneity within this group, likely shaped by their diverse backgrounds, industries, and entrepreneurial trajectories.

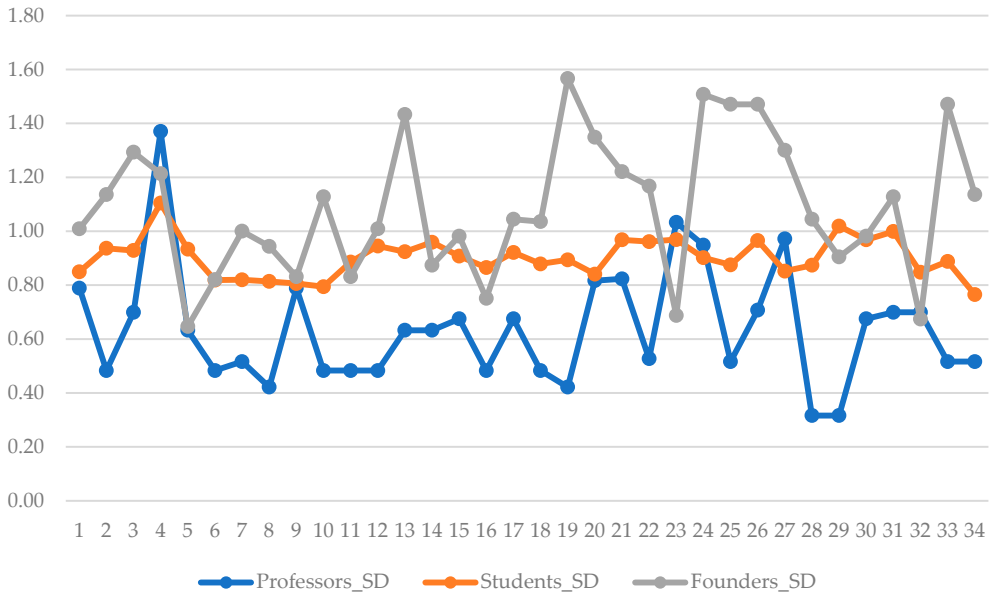


Figure 2. Standard deviation analysis of stakeholder responses on entrepreneurship and start-up development in HEIs.

Overall, the comparative analysis confirms that while certain success factors are broadly supported across groups, stakeholder perspectives also diverge in meaningful ways. These intergroup differences are crucial for interpreting the findings, particularly about similar studies, and are discussed further in the next section.

5. Discussion

Based on the systematic analysis of stakeholder perceptions, this study proposes a three-tiered framework of influential factors in student start-up success within HEIs (Figure 3). The framework is both empirically grounded and theoretically informed, integrating findings from descriptive data with conceptual insights from entrepreneurial ecosystem theory (Guerrero & Urbano, 2012; Stam, 2015). Each level reflects the dynamic interplay of institutional, personal, and contextual dimensions that collectively shape entrepreneurial outcomes in higher education settings.

The framework emerged directly from descriptive data across three stakeholder groups: business students, entrepreneurship professors, and experienced start-up founders. By integrating agreement scores and standard deviation values across 34 validated statements, the analysis revealed distinct levels of perceived impact, allowing for the categorization of success factors into high, medium, and low tiers of influence. This empirically grounded framework addresses the current gap in the scientific literature and the need for a stakeholder-informed framework that reflects the complex dynamics of entrepreneurial ecosystems within an academic context.

While prior studies have addressed institutional and individual success factors in isolation, few have triangulated insights across different stakeholder groups to assess how these factors operate within the same institutional context. By applying a descriptive statistical approach, this study captured both consensus and variability in stakeholder assessments, providing a structured basis for understanding which institutional, personal, and contextual factors are most consistently prioritized.

This section proceeds by examining each level of the framework regarding the existing literature, thereby contextualizing the findings within broader scholarly debates. In doing so, it addresses the pressing question of how HEIs can better align support mechanisms with the expectations and lived experiences of students and entrepreneurial actors.

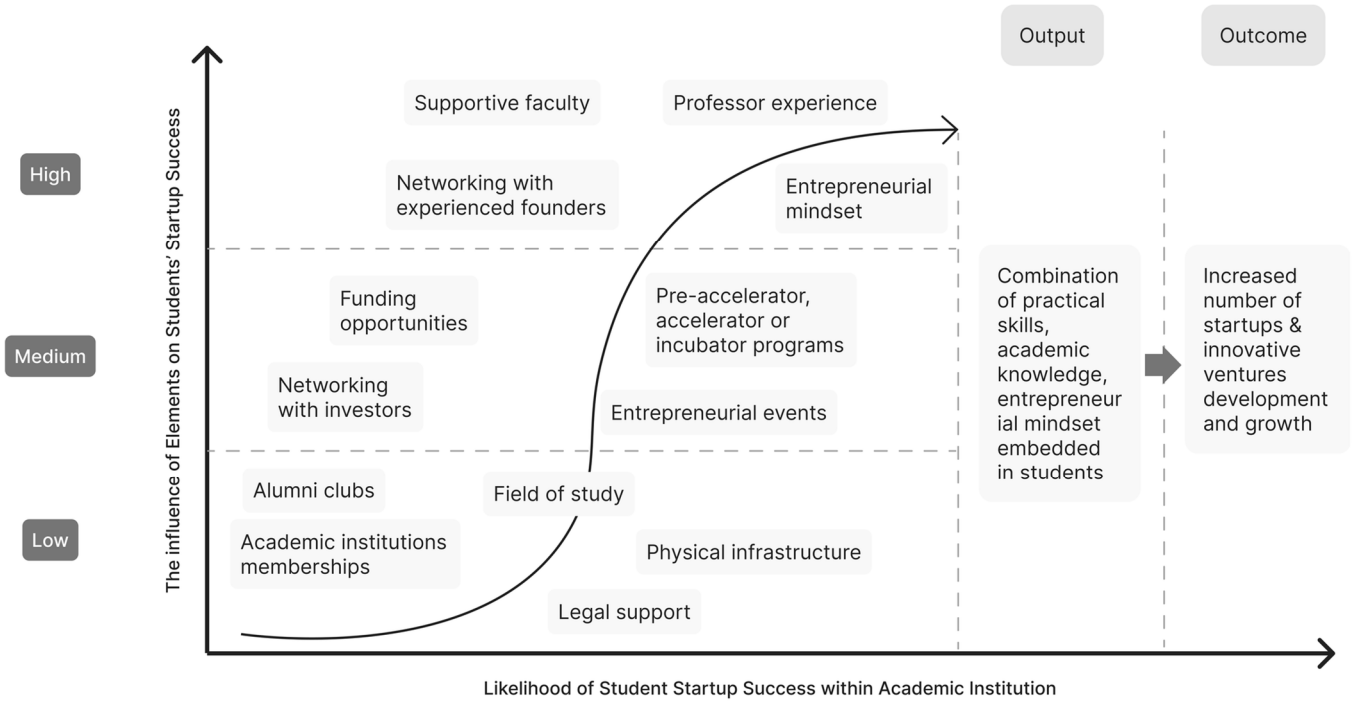


Figure 3. Framework of influential factors in student start-up success within academic institutions.

5.1. High-Impact Factors

At the top tier, factors receiving the highest consensus include faculty entrepreneurial experience, student entrepreneurial mindset, supportive faculty, and networking with experienced founders. These findings echo and extend existing research. The significance of faculty with entrepreneurial experience has been emphasized as a crucial enabler of student confidence and venture initiation. Professors who have engaged in entrepreneurial activity serve as role models and transmit tacit knowledge, which is often more impactful than theoretical instruction alone (Boldureanu et al., 2020; Wraae et al., 2022). Morris et al. (2017) argue that such experience enhances students' understanding of entrepreneurial risks and decision making under uncertainty.

Similarly, the importance of mindset characteristics like resilience, willingness to fail, and internal motivation is well supported by research on entrepreneurial intention and psychological capital (Hägg & Kurczewska, 2021; Kitsios et al., 2021; Van Gelderen, 2023). These findings align with broader paradigms in entrepreneurial education that prioritize action-based learning and personal transformation over mere content delivery (Kakouris & Liargovas, 2021). Mentorship and access to networks, primarily through experienced founders, emerged as another high-impact factor. This reinforces studies suggesting that learning from practitioners, rather than institutional actors, improves both entrepreneurial competence and venture survival rates (El-Awad et al., 2024; Landoni et al., 2021). Peer learning and founder networks offer not only technical insights but also emotional validation, thereby reinforcing the development of entrepreneurial identity.

5.2. Medium-Impact Factors

The second tier comprises institutional mechanisms, including incubators, pre-accelerators, entrepreneurship events, investor networking, and access to funding. While these elements are widely implemented across HEIs, their perceived contribution was moderately valued but not regarded as central to early-stage venture success. This aligns with research suggesting that while such mechanisms provide structure, they often lack the

flexibility and personalization required by nascent entrepreneurs (Lo & Theodoraki, 2021; Miliou & Ioannou, 2024).

Experiential activities such as hackathons and workshops received more consistent agreement than resource-intensive programs like accelerators. This supports findings from Morris et al. (2017), who argue that practical, action-oriented initiatives better support entrepreneurial learning than static infrastructure. Furthermore, the inclusion of funding in this tier reflects a nuanced stakeholder view; while financial capital is important, it is not sufficient on its own and is best coupled with guidance and mentorship (Klyver & Schenkel, 2013; Shirokova et al., 2018).

5.3. Low-Impact Factors

Contrary to longstanding assumptions in the academic entrepreneurship literature, factors, such as legal support, physical infrastructure, alumni engagement, institutional memberships, and academic field of study, were consistently rated as having low impact by all three stakeholder groups. These elements not only received the lowest mean agreement scores but also, in several cases, showed substantial variation in perceptions, particularly among experienced founders.

This challenges the prevailing notion that institutional scaffolding alone provides a solid foundation for student entrepreneurship. For instance, although alumni networks and HEI memberships are frequently cited as valuable sources of social capital, their perceived effectiveness appears limited or inconsistently realized in student contexts (Landoni et al., 2021; Wraae et al., 2022). Similarly, the low relevance attributed to legal and regulatory support suggests that such formal structures may be insufficient, or even counterproductive, when not aligned with the dynamic needs of early-stage entrepreneurs.

Notably, the assumption that non-business students are inherently disadvantaged in venture creation was broadly rejected. This finding resonates with contemporary research emphasizing the value of interdisciplinary innovation and cross-domain entrepreneurial potential (Cantamessa et al., 2018; Hahn et al., 2017). As a result, HEIs may need to reassess rigid assumptions about disciplinary fit and instead foster inclusive entrepreneurial pathways that accommodate diverse academic backgrounds.

The consistently low rankings of legal infrastructure, public funding mechanisms, and institutional affiliations may also reflect a deeper skepticism among experienced founders toward formalized or bureaucratic forms of support. Their responses displayed the highest internal variability, suggesting that while some founders recognize the value of such resources, others rely more heavily on informal networks, sector-specific knowledge, or entrepreneurial capital developed outside academic environments. This heterogeneity likely stems from the diversity in founders' sectors, venture maturity, and prior experiences, factors that shape their understanding of what mechanisms truly enable success.

In contrast, more uniform responses from students and professors may reflect their shared exposure to institutionally embedded support systems, which are often standardized and framed through the academic lens. This divergence reinforces the importance of incorporating practitioner perspectives into the design and evaluation of entrepreneurship education strategies, especially when attempting to build ecosystems that are responsive to real-world entrepreneurial demands.

6. Conclusions

This study explored how key stakeholders within higher education environments perceive the relative importance of institutional, personal, and contextual factors in contributing to the success of student-led start-ups. Drawing on validated literature-based variables and grounded in entrepreneurial ecosystem theory, this study triangulated perspectives

from students, professors, and experienced founders to construct a stakeholder-informed framework of success factors. Organized into three levels based on perceived impact and level of consensus, the framework provides an empirically grounded lens through which to evaluate and improve existing entrepreneurial support systems. It critically reflects how institutional structures align or fail to align with the lived realities and expectations of those most engaged in academic entrepreneurship, offering both a conceptual model and a practical guide for enhancing start-up outcomes in higher education.

6.1. Theoretical Implications

This study makes several theoretical contributions to the literature on entrepreneurial ecosystems and education. First, it reinforces the growing body of research that emphasizes the significance of intangible enablers, such as mentorship, entrepreneurial mindset, and experiential learning, over traditional material inputs like infrastructure and institutional investment. While formal structures, such as incubators and funding, remain relevant, our findings suggest that they are not perceived as central to early-stage venture success. Second, the research offers an integrated framework that synthesizes institutional, individual, and contextual dimensions of student entrepreneurship within HEIs. This multidimensional approach addresses a persistent gap in the existing literature, which often treats success factors in isolation. Finally, the stakeholder triangulation contributes to theoretical rigor by highlighting convergences and divergences in perception across academic and practical domains. The finding that high-impact factors are those grounded in social and human capital extends current debates on the evolving nature of entrepreneurial education. It underscores the need for the deeper integration of experiential and relational dimensions into theoretical models.

6.2. Practical Implications

The findings have several important implications for institutional leaders, educators, and policymakers seeking to strengthen entrepreneurial ecosystems within higher education. The proposed three-tier framework serves as a diagnostic tool to evaluate and redesign entrepreneurship support strategies based on stakeholder-informed priorities. In particular, the results reveal a persistent mismatch between the conventional focus on institutional infrastructure, such as physical facilities, legal support, and formal funding schemes, and the factors that students and founders perceive as the most influential. High-impact elements rooted in social and human capital, such as mentorship opportunities, entrepreneurial mindset development, and faculty with entrepreneurial experience, should be prioritized in curriculum design, hiring practices, and co-curricular initiatives. These relational forms of support can be further enhanced by embedding mentorship into academic programs, recruiting practitioner-educators, and fostering interdisciplinary and experiential learning environments that nurture entrepreneurial behavior. Medium-impact mechanisms such as hackathons, incubators, and investor networking remain relevant but require ongoing adaptation to ensure alignment with student needs and accessibility. Conversely, low-rated institutional assets like legal advisory services and alumni engagement should be critically reassessed for effectiveness, visibility, and fit within the broader support system. Policymakers can use these insights to develop more targeted funding, training, and evaluation strategies that move beyond material inputs and toward fostering dynamic, inclusive, and practice-oriented entrepreneurial ecosystems in HEIs.

6.3. Limitations

This study is not without limitations. It was conducted within a single HEI context in Lithuania, which may limit the generalizability of findings to other national systems or institutional types. The sample size, while appropriate for exploratory analysis, was relatively

small for professors and founders, which may affect representativeness. Furthermore, this study relied on self-reported perceptions, which are subject to respondent bias and do not capture causal relationships between success factors and venture outcomes. Additionally, the focus was confined to HEIs in the social sciences, and the results may not fully reflect entrepreneurship dynamics in technology-intensive or science-driven disciplines.

6.4. Agenda for Future Research

Future research could expand the scope of the framework by including additional stakeholder groups such as angel investors, policymakers, and university administrators to enrich the systematic perspective. Comparative studies across countries or institution types would be valuable in testing the applicability of the framework across different contexts. Further empirical work could also investigate causal relationships between the identified factors and actual start-up outcomes. While this study provides a stakeholder-informed framework based on descriptive comparisons, future research could apply inferential methods, such as Structural Equation Modeling (SEM), to test causal relationships among the identified factors. Finally, longitudinal studies that trace the evolution of student ventures over time could provide deeper insights into how different forms of support influence long-term entrepreneurial success.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Full list of statements.

Factor Group	No.	Statement
Educational programs (curriculum & courses)	1	Bachelor's programs in start-ups and entrepreneurship can foster start-ups development at higher educational institutions
	2	A higher number of technological subjects taught at educational institutions can foster the creation of start-ups
	3	A higher number of entrepreneurship subjects taught at educational institutions can foster the creation of start-ups
	4	The field of study is perceived to influence start-up success, with non-business students considered to be at a relative disadvantage compared to those in business-related disciplines

Table A1. *Cont.*

Factor Group	No.	Statement
Educational programs (curriculum & courses)	5	Access to the latest technologies on campus can significantly enhance the potential for start-up success
	6	Professors with prior entrepreneurial or business experience are seen as key enablers of successful student start-up development
	7	The entrepreneurial atmosphere and culture of an institution, play a crucial role in fostering a conducive environment for start-up development and success
	8	Supportive academic staff guide students' entrepreneurial efforts by embedding mentorship, resources, and encouragement within the learning process, helping transform ideas into viable start-up initiatives
	9	Involvement of university in scientific research on start-up, innovation, and entrepreneurial endeavors enhance the successful start-up development
University entrepreneurial incentives (informal)	10	Participation in structured pre-accelerator initiatives can effectively stimulate student engagement in early-stage venture development
	11	Accelerator programs tailored to student' needs can play a key role in advancing their entrepreneurial initiatives
	12	Student access to incubator services can support the transition of start-up ideas into actionable business models through guided development
	13	The active programs of a start-up studio can significantly foster students' initiatives in developing start-ups
Events and Networking	14	Hackathons, framed as entrepreneurial competitions, can foster the creation of student-run startups
	15	Academic and practical entrepreneurship conferences at higher educational institutions can foster the creation of student-run startups
	16	Workshops at higher educational institutions can foster the creation of student-run start-ups
	17	Summer start-up bootcamps organized by higher educational institutions can be catalysts for students to create their startups
	18	Connecting with experienced entrepreneurs through networking opportunities can enhance the development of student-led start-ups
	19	Connecting with potential investors through targeted networking can support the growth and viability of student-initiated ventures
	20	Networking with entrepreneurial alumni can encourage student-run start-up development
	21	HEI memberships in diverse networks, such as business angels' associations, can provide valuable resources and connections, further facilitating the growth of student-run start-up ventures
HEI's direct support	22	Access to legal and regulatory support, such as trademarking, patenting, and business registration, can support the creation and growth of student ventures within HEIs
	23	Allocating dedicated spaces and facilities (e.g., labs, innovation corners, coworking hubs) can meaningfully contribute to students' start-up activities and development efforts

Table A1. *Cont.*

Factor Group	No.	Statement
Student-run incentives, internal motivation & attitudes	24	Entrepreneurial and student-led start-up clubs contribute to an innovation-oriented environment by facilitating peer support, collaboration, and shared learning, which can enhance start-up success
	25	Events organized by students create dynamic platforms for networking, skill-building, and idea exchange, serving as catalysts for nurturing and propelling student-led start-ups
	26	Embracing risk tolerance, fueled by ambition and a readiness to tackle challenges, is fundamental for budding entrepreneurs, as these traits often dictate the trajectory and resilience of their start-up journeys
	27	Actively embracing challenges outside one's academic comfort zone can serve as a driving force in advancing student-led entrepreneurial initiatives
	28	Viewing failure as a learning opportunity and maintaining a growth-oriented mindset are essential elements in the development of student-driven start-ups
	29	Confidence in one's abilities strengthens perseverance and plays a fundamental role in achieving success in student-run start-ups
	30	Thrive for industry experience is one of the key factors for successful student-run startup development
	31	Growing up in an entrepreneurial family or having parents engaged in business ventures can significantly increase the likelihood of a student launching a successful startup
Funding opportunities	32	Direct investment by HEIs in student-run start-ups can catalyze and encourage the emergence of more such entrepreneurial ventures
	33	Private investments from sources such as internal funds, private investors, sponsors, and corporates can catalyze and encourage the emergence of more student-run entrepreneurial ventures
	34	Project-based funding, whether from national or EU projects, as well as grants, can catalyze and encourage the emergence of more student-run entrepreneurial ventures

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