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UNIVERSITY ENTREPRENEURIAL ECOSYSTEMS: START-UP FOUNDERS' PERSPECTIVES ON CRITICAL FACTORS FOR STUDENT START-UP SUCCESS

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ABSTRACT. The aim of this research is to identify and analyze the key elements within university entrepreneurial ecosystems that contribute to the success of student start-ups, based on the perspectives of experienced start-up founders. Through a mixed-methods approach, this research captures the insights of experienced startup founders, particularly those who have achieved measurable success within the digital start-up space in Lithuania. Ten start-up founders are selected based on the proven success of their business models, demonstrated by a consistent revenue stream or significant capital investment. Content validation method and descriptive statistical analysis were applied to survey responses, focusing on central tendency and variability measures to assess the degree of consensus among founders for provided statements. The study highlights the integral role of educators with entrepreneurial backgrounds and the prioritization of practical, hands-on learning experiences over traditional academic methods. A notable divergence from established perceptions is the founders' view on funding, which, contrary to expectations, is not seen as a critical determinant of startup success within university settings. These findings present a compelling case for reorienting entrepreneurial education towards experiential learning and support mechanisms that align with the dynamic requirements of startup culture. They also lay the groundwork for future studies to expand on the multidimensional perspectives of different stakeholders in the student startup ecosystem.

JEL Classification: M10, I21, M13

Keywords: start-ups, student entrepreneurship, university start-up ecosystem.

Introduction

A substantial body of research conducted in recent years has demonstrated that conventional methods for establishing new businesses and innovative enterprises are frequently ineffective. Scholars have reported that approximately 90% of start-ups fail (Bangdiwala et al., 2022; Subrahmanya, 2022), while the success rate of starting a business is relatively low. Some studies have indicated that only 1 in 12 start-ups and innovative companies succeed in establishing a successful business (Startup Genome, 2023). Other studies reveal that as many as 75% of startup venture capital investments fail in the later stages of development (Gosh, 2020). Other researchers report similar rates of startup failure (Yusoff et al., 2019).

These studies identify the most common reasons for startup failures, including products that do not meet market needs, conflicts within development teams, poorly planned cash flows, lack of finance, inability to attract venture capital investment, failure to create a competitive advantage, inappropriate business models, and ineffective marketing strategies (Szathmari et al., 2024). Moreover, a study published in the Harvard Business Review states that the average age of a successful startup founder is 45 years old (2018). The high failure rate and these reasons for unsuccessful startup attempts suggest that founders often lack the knowledge, skills, and understanding of how the entire startup ecosystem functions and, fundamentally, what the supporting startup ecosystem framework should be in this entrepreneurial journey.

Besides being seen as theoretical and bureaucratic institutions, universities are increasingly recognized for their pivotal role in fostering innovation and entrepreneurship among students (Duong et al., 2022). This evolving perception underscores the potential of academic environments to bridge the gap between theoretical knowledge and practical application, fostering the next generation of entrepreneurs.

On other hand, students often lack real-life experience, skills, knowledge, emotional intelligence, and other qualities needed for successful startup building and scaling. By mitigating these restrictions related to student startup creation, universities play a critical role in fostering academic entrepreneurship, which serves as a foundation for student-run startups by providing social, human, and, to some extent, financial capital.

While prior research has explored various factors that influence university startup ecosystems, few studies have focused on the direct perspectives of experienced founders in identifying the key success factors for student startups within universities. Creating an appropriate, effective, and impactful structure for fostering startup ecosystems in academic environments continues to be a significant topic for research. Thus, the aim of this paper is to identify and analyze key elements within university entrepreneurial ecosystems that contribute to the success of student start-ups based on experienced startup founders' perspective. The objective of this research introduces a novel approach by drawing on insights from experienced startup founders to offer actionable recommendations for improving university-based entrepreneurial ecosystems, distinguishing it from previous studies. To achieve this, an analysis of relevant scientific literature was conducted, and, furthermore, ten experienced startup founders were selected for a survey to gather empirical data. To ensure the validity of their opinions, the content validation method was applied.

This study contributes to scientific literature by providing insights from successful startup founders, offering a new perspective on the role of university ecosystems in fostering entrepreneurship. From a managerial standpoint, the findings suggest that universities should prioritize their resources toward experiential learning and networking opportunities rather than traditional financial support mechanisms.

The paper is divided into sections. The first section analyzes the scientific literature on factors influencing the entrepreneurial ecosystem at universities. The second section describes

the research methodology. In the third section, the results of the research are analyzed. The fourth section provides a discussion of the findings. Finally, the last section presents the conclusions and proposes recommendations for further studies.

1. Literature review

Startups are a relatively new concept in entrepreneurship, characterized by their focus on innovation, rapid growth, and operation under uncertainty (Maciejewski et al., 2019). While there is no universally accepted definition, startups are generally viewed as newly established enterprises aimed at creating innovative products or services to solve specific problems (Ehsan, 2021). Key attributes include scalability, risk-taking, and the pursuit of optimal business models (Fiorentino et al., 2021; Maciejewski et al., 2019). Startups are often associated with high-tech sectors but can encompass various industries (Vonoga, 2018). The concept has evolved to include corporate startups, which are internal initiatives leveraging company resources to address business challenges (Akter et al., 2020). Despite their potential for economic growth and innovation, startups face high failure rates, emphasizing the need for better understanding and support (Vonoga, 2018). For this study, startup is defined as early-stage company characterized by innovation, growth potential, and risk, and operating under extreme level of uncertainty (Blank, 2013; Ries, 2011).

Currently, scientific literature that researches the success factors of startup ecosystems at the university level is still developing. While researchers have explored various aspects of students' entrepreneurship development and modeling within universities (e.g. Schimperna et al., 2021; Barbini et al., 2021; Sansone et al., 2021; Blesia et al., 2021;), there remains a notable gap in knowledge regarding the specific factors that contribute to the emergence of successful startups at this level. Understanding how the startup ecosystem environment within universities aids in the development of startups is crucial. It is important to identify not only the elements that constitute a university startup ecosystem but also to consider the process of startup creation itself as a key factor.

In the analysis of scientific literature on university support for student startups, several key areas of focus have emerged. Scholars have extensively examined the impact and role of funding, networking, and educational programs, family background, student's entrepreneurial mindset orientation and personal traits as well as the integration of support mechanisms such as accelerators and incubators within university curricula. These studies highlight the importance of comprehensive support structures in fostering the development and success of student-led startups.

The findings reveal that extracurricular activities, networks, entrepreneurial culture, and leadership have an important impact on the formation and operation of the university entrepreneurial ecosystem (Wang et al. 2021; Rodríguez & Muñoz-Fernández, 2022). Research indicates that university accelerators with a selective process significantly enhance firm performance in employment and product expansion (Breznitz et al., 2019). The critical role of universities in fostering entrepreneurial ecosystems through educational programs and stakeholder collaboration is also emphasized, underscoring the need for developing entrepreneurial competencies (Závodská, 2019). Additionally, the incremental approach to building entrepreneurial ecosystems and the necessary adaptations by universities to support student entrepreneurship are highlighted (Matt et al., 2018). A comprehensive framework encompassing various university-based entrepreneurial support mechanisms and the dynamic nature of the university environment is proposed (Wright et al., 2017).

The role of business studies in fostering startups and entrepreneurship at universities has been extensively explored by many scholars. Entrepreneurial education, coupled with prior

experiences, plays a key role in shaping students' entrepreneurial motivation by improving their perceived feasibility and utility of business. The impact of technology business incubation and the influence of academic settings on student startups underline the importance of supportive university policies (Głodowska et al., 2023; Lyken-Segosebe et al., 2020; Åstebro et al., 2012; Morris et al., 2017). The diversity of startups arising from effective entrepreneurship education further highlights its necessity in fostering an entrepreneurial spirit among students (Hahn et al., 2017).

The discussion extends to the practical applications and supporting systems that actualize these theoretical concepts. The establishment and role of business incubation centers and university accelerators are examined as critical factors between academic knowledge and entrepreneurial practice. These structures offer essential resources, mentorship, and networking opportunities, enabling students to convert innovative ideas into sustainable startups. The establishment of business incubation centers at universities can significantly aid in developing the entrepreneurial ecosystem, offering specialized strategies such as specialization, diversification, and competition (Vardhan et al., 2022; Theodoraki, 2020; Németh et al., 2023). University accelerators have been specifically identified as having a substantial impact on the growth of student startups, contributing positively to the broader entrepreneurial landscape (Breznitz et al., 2019). The seed accelerator model, known for its educational and mentorship programs, has proven effective within regional entrepreneurial environments (Hochberg, 2016). Incubators and accelerators are essential to the startup and entrepreneurship ecosystem, providing necessary support, resources, and networks to foster high-growth innovative startups (Bliemel et al., 2016). They offer a myriad of services, including advice and hosting, proving especially beneficial for technology entrepreneurs (Isabelle, 2013).

The significance of technology skills for entrepreneurship has been extensively researched. The suggestion to incorporate startup experiences into university curricula to furnish students with practical IT skills has been put forward (Karpenko, 2022). The critical need for incorporating entrepreneurship education within technical fields and its positive influence on shaping students' entrepreneurial mindsets has been identified (Dimov et al., 2022). Moreover, the importance of providing technology entrepreneurship education and attracting students with technical expertise has been stressed (Haneberg et al., 2020).

Funding discussions and financial support for student startups at universities are prevalent topics within the scientific community, yet conclusions remain mixed (Hisrich et al., 2020). Various funding sources, including debt or equity financing, commercial banks, and alternatives like private equity and venture capital, are often explored (Hisrich et al., 2020; Bigos & Michalik, 2024). Contrasting viewpoints exist regarding the impact of university financial support on student startup activities, with some studies suggesting a negative influence (Morris et al., 2017; Choi et al., 2017; Klyver et al., 2013), while others propose crowdfunding as a beneficial alternative for supporting emerging university startups (Wieck et al., 2013). The efficacy of direct financial support, such as equity and debt capital, in incentivizing student entrepreneurship is also debated (Yu, 2010). Moreover, the significance of bootstrapping and developing a supportive infrastructure for entrepreneurship on campuses is emphasized when resources are limited (Weinrauch, 2005).

In terms of the entrepreneurial mindset and personal traits, the role of an entrepreneurial mindset, including attitudes towards failure, risk tolerance, and the willingness to step out of one’s comfort zone, is deemed significant in influencing students' entrepreneurial intentions and orientations (Daspit et al., 2021). Factors such as entrepreneurial motivation, self-efficacy, and risk tolerance are identified as key influencers of entrepreneurial intention (Hägg et al., 2021). The benefits of experiential learning formats that prompt students to leave their comfort zones are underscored in the development of entrepreneurial competencies and mindsets (M.

van Gelderen, 2023). Furthermore, the influence of the environment and personal traits, such as self-confidence and fear of failure, on students' startup intentions and their impact on entrepreneurial orientation are documented (Phuong et al., 2020).

Emotional intelligence is widely researched in relation to student entrepreneurship, highlighting its significant association with entrepreneurship among university students. There's a notable finding that emotional intelligence correlates positively with the ability for entrepreneurship among youths (Kitsios et al., 2021). Additionally, there's a direct link between emotional intelligence and entrepreneurial intention, particularly strong in emotion regulation (Gelderen, 2023). It has been observed that students with more effective emotion management skills are more inclined to consider entrepreneurial careers (Kwapisz, 2022). Furthermore, emotional intelligence has been shown to positively affect entrepreneurial orientation, a relationship that is somewhat influenced by the presence of entrepreneurial education (Mawson et al., 2023). Additionally, the importance of emotional, social, and cognitive competencies in shaping entrepreneurial intentions has been emphasized, with international and cultural experiences also playing a role, albeit indirectly, in influencing self-employment intentions (Bonesso et al., 2018).

Family background has been extensively studied in relation to students' entrepreneurship, revealing that a family business background generally exerts a positive influence on students' entrepreneurial intention and career choices. This influence manifests in various ways, including enhanced knowledge, skills, confidence, and attitudes towards entrepreneurship, which in turn, make entrepreneurial education more impactful for these students (Abun et al., 2022). Furthermore, a connection has been established between having an entrepreneurial family background and higher entrepreneurial intentions (Georgescu et al., 2020).

The role of alumni in student entrepreneurship has been the focus of various studies, demonstrating the supportive role alumni clubs at universities can play in networking, funding, and providing hands-on practical experiences for student entrepreneurs (El-Awad, 2022; Landoni et al., 2021). These clubs are particularly noted for offering valuable resources, notably information, which are followed by materials, clients, and human, technological, and financial resources. The evolving landscape of entrepreneurship among technology-based university alumni and the development of an ecosystem supporting student startups have also been examined (Wright et al., 2017). Furthermore, the significance of alumni networks and practical experiences in boosting the success rates of student startups is underscored (Lange et al., 2012).

The impact of educators' previous experience in entrepreneurship on students' startup creation is a notable factor discussed in scientific literature. The role of teachers as role models has been investigated, revealing that teachers viewed as role models can elevate students' entrepreneurial intentions and enhance their attitudes and competencies towards entrepreneurship (Wraae et al., 2020, San-Martín et al., 2019). Furthermore, students with converging learning styles experience a higher increase in entrepreneurial intentions when instructed by teachers with entrepreneurial experience (Diegoli et al., 2018). Additionally, the positive influence of educators' roles, enthusiasm, and motivation on students' interest in entrepreneurship is highlighted, along with the beneficial effects of internship experiences (Baloch et al., 2018).

Insights into the factors shaping students' perceptions of university entrepreneurship support, as well as the challenges institutions face in fostering an entrepreneurial ecosystem, have been discussed (Lu et al., 2021; Matt et al., 2018). The importance of university support for entrepreneurship in shaping students' entrepreneurial intentions is emphasized, particularly noting the entrepreneurial climate's mediating role (Sim et al., 2021; Bergmann et al., 2018). Furthermore, the positive link between student engagement in entrepreneurship-related

programs, societal desirability of entrepreneurship, and startup activities has been observed (Morris, 2017). Lastly, the significant role of students' perceptions of the university environment in influencing their entrepreneurial attitudes and intentions is underscored (Zollo et al., 2017).

It can be noted that while previous studies have extensively explored the components of university-based entrepreneurial ecosystems - such as mentorship, incubators, and funding opportunities - research focusing on the perspectives of experienced startup founders remains limited. Most studies approach the topic from the viewpoint of students or educators (Mitra et al., 2023; Wraae et al., 2022), leaving a critical gap in understanding how those who have successfully launched and scaled startups perceive and evaluate these ecosystems.

The absence of founders' perspectives is a significant gap in the literature, as their experience in navigating the entrepreneurial journey provides valuable insights into the real-world utility and effectiveness of these ecosystems. By bringing in the voices of experienced founders, this study aims to bridge the gap between academic theory and entrepreneurial practice, offering actionable recommendations for universities to optimize their startup support structures.

Thus, our research is one of the first to holistically investigate how experienced founders view university startup ecosystems, thus making a novel contribution to both academic entrepreneurship research and the practical design of entrepreneurial support programs in higher education as the recent technological and entrepreneurial revolution has spurred new incentives to launch high-risk ventures, namely startups, however, available data suggests that the success rate of startups is relatively low. This challenge becomes even more pronounced in the context of student entrepreneurship and startup creation at universities. The significant increase in research studies focusing on students' entrepreneurship at universities highlights the importance of this topic and the interest of various stakeholders.

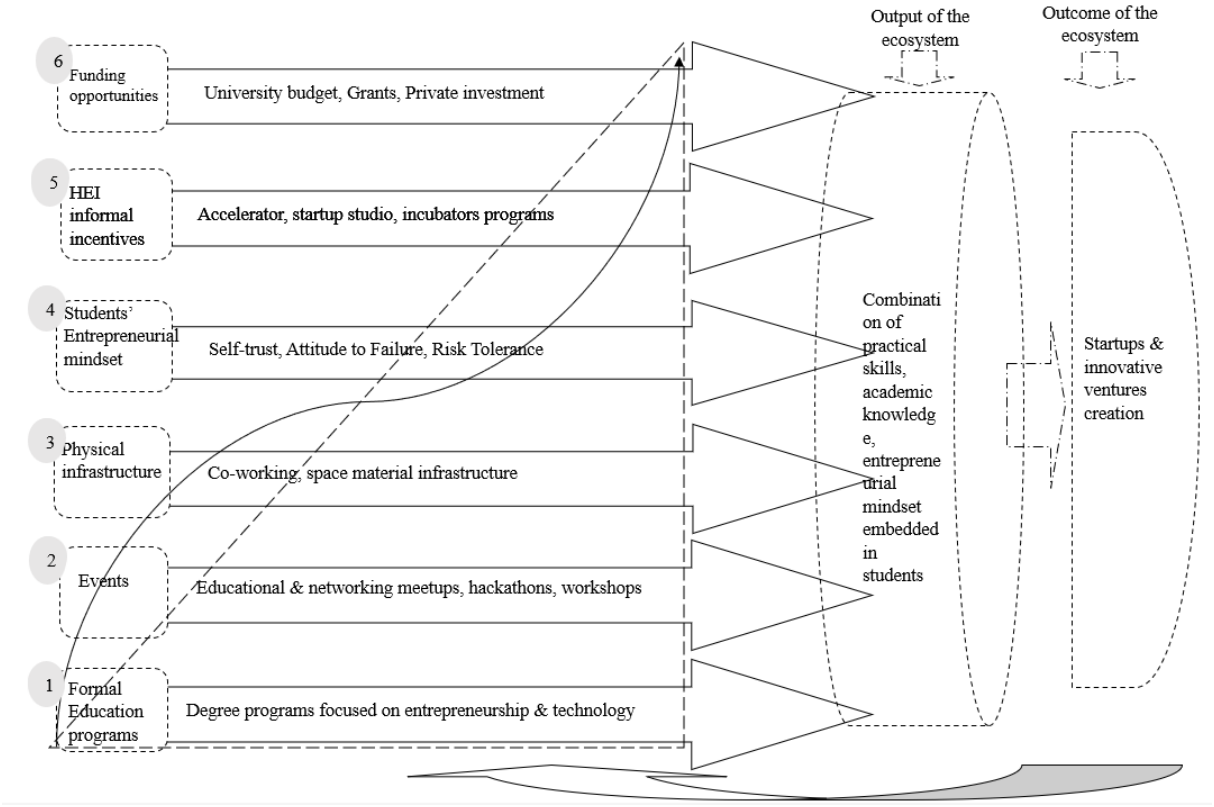

Figure 1. University Entrepreneurship Ecosystem Framework
Source: the authors

Commonly, students face numerous challenges, including a lack of knowledge, skills, capital, networks, real-life experience, industry expertise, and an entrepreneurial mindset encompassing emotional intelligence, risk tolerance, and a positive attitude towards failure. On the other hand, universities are often considered as institutions primarily focused on theoretical learning, with a lack of emphasis on real-world training. This perception creates additional challenges in fostering student entrepreneurship and the development of startups. A review of the literature on student startup creation phenomena has revealed the complex nature and multilevel environment of the university entrepreneurial ecosystem. This ecosystem comprises both tangible resources, such as funding and infrastructure, and intangible assets, including knowledge and mindset. The proposed logical scheme illustrates this complexity (Figure 1). The framework underscores the synergistic relationship between these components, essential for fostering student-led startups. The outcome of the ecosystem is a formation of combination of practical skills, academic knowledge, and an entrepreneurial mindset, embedded in students, which leading to the final output - the creation of startups and innovative ventures. This comprehensive approach suggests that the success of student startups is not solely dependent on one element but rather on the cohesive and dynamic interaction of various ecosystem components, and this leads to research hypothesis formulation: In early-stage student-run startups, social capital and human capital elements - such as formal education programs, professors' previous experiences, supportive events, networking and a positive entrepreneurial mindset - are more influential than financial resources in enhancing the effectiveness of university entrepreneurship ecosystems and significantly increase the likelihood of successful startup development.

2. Methodological approach

The research methodology was designed to analyze and systematically gather data from successful start-up founders, thereby providing valid insights into how universities can foster entrepreneurship and start-up creation.

The study employed a mixed-methods approach, combining qualitative and quantitative methods, to better understand the perspectives of founders of successful start-ups.

Firstly, to effectively survey the founders of successful start-ups, it was essential to define what constitutes 'success' in a business context. According to Brandstätter (2011), business success is often associated with factors such as the ability to acquire many users in a short period, as well as turnover, profit, return on investment, productivity, and the number of employees. Steffens et al. (2009) also highlight sales growth and company age as common indicators of success. While success in a regular company is approached from a holistic perspective, in the start-up world, success is typically considered to be the validation of a business model, evidenced by acquiring paying clients or attracting investment which indicates that the start-up has validated its business model, adapted its product to market needs, secured a more consistent cash flow, and is posed for exponential growth.

Research Design. To establish a solid foundation for choosing experienced founders of successful startups as key informants in a study on how universities can promote startup creation, several key rationales can be articulated:

- Expertise and Relevance: Experienced startup founders possess a wealth of practical knowledge and insights that are highly relevant to the topic. Having navigated the journey from concept to successful implementation, these individuals have firsthand experience with the challenges and successes of startup development. Their perspectives are invaluable in understanding what works in practice, as opposed to purely theoretical knowledge.

- Validation of Business Models: Successful startup founders have effectively validated their business models in the real world. This validation process typically includes critical aspects such as identifying viable markets, developing sustainable revenue models, and achieving scalability. Their experience in these areas can provide universities with practical insights into the key components of fostering successful entrepreneurial ventures.
- Network and Ecosystem Understanding: These founders often have extensive networks within the entrepreneurial ecosystem, including investors, incubators, and other startups. This network gives them a broader understanding of the ecosystem, including how universities can play a more integral role in supporting startup growth and development.
- Experience with various Startup Support Mechanisms: Some successful founders may have benefited from support mechanisms such as incubators, accelerators, mentorship programs, or entrepreneurship courses. They can provide first-hand feedback on the effectiveness of these initiatives and suggest improvements or new ideas based on their experiences.
- Feedback on Curriculum Relevance: Founders who have successfully applied their knowledge and skills in the real world can provide valuable feedback on the relevance and applicability of university entrepreneurial ecosystem. They can highlight which skills and knowledge areas were most beneficial and which areas might need more focus or improvement.
- Understanding of Skills and Competencies Needed: They can offer insights into the skills and competencies that are crucial for entrepreneurial success, which can help universities tailor their programs to better equip students for startup ventures.
- Long-term Perspective on Startup Success: Experienced founders can provide a long-term perspective on what it takes to sustain and grow a startup, offering insights that go beyond initial setup and funding.

In summary, experienced startup founders of successful startups are chosen for their practical experience, validated success, and broad understanding of the entrepreneurial ecosystem, all of which are essential for providing in-depth, actionable insights on how universities can effectively promote startup creation and entrepreneurship.

Secondly, this study utilized a survey design method to understand the experiences of successful startup founders and their perceptions of student-run startups at the university level. The online survey was developed using the Google Docs tool. The questionnaire comprised both closed-ended and one open-ended questions, designed to capture quantitative data and qualitative insights, respectively. Responses were measured on a five-point Likert scale ranging from 'strongly disagree' to 'strongly agree.

The profile of start-up founders. Firstly, all participating startup founders possessed over 10 years of experience in business, entrepreneurship, and startup development, and were aged over 30 years. This selection was based on the previously discussed fact that older startup founders are more likely to create successful startups. Secondly, the selection criteria for these founders included having either a consistent revenue stream or having attracted investment, as these factors are indicative of a validated business model and, consequently, considered a marker of success for the purpose of this study. Therefore, a targeted approach was used for the selection of founders. Invitations to participate in the survey were extended to those who met these specific criteria. Thirdly, the study focused on startup founders who were based in Lithuania at the time the survey was conducted.

The study combines qualitative and quantitative methods. The study employed a mixed-methods approach, blending qualitative and analytical techniques. Content validation as a qualitative method is widely used to ensure the accuracy, relevance, and representativeness of research instruments, such as surveys, interviews, or frameworks. This method involves systematically evaluating whether the content of the instrument adequately reflects the

construction it aims to measure (Thorn et al., 1989). Typically, content validation is conducted by gathering input from subject matter experts who review and assess each item for clarity, appropriateness, and alignment with the study's objectives. By synthesizing expert feedback, researchers can refine their instruments, ensuring they capture the essential dimensions of the phenomena under study. This approach enhances the credibility and reliability of qualitative research by validating that the data collection tools are well-grounded in the theoretical and practical aspects of the subject matter (Johansen et al., 2023).

There is ongoing debate among scholars regarding the optimal number of experts that should be involved in the content validation process. It has been proposed that a minimum of three experts is necessary to ensure effective content validation (Lynn, 1986). A comprehensive validation process requires at least three panels, including both content experts and laypersons (Rubio et al., 2003). Further research suggests that the ideal number of experts may vary significantly, from as few as two to as many as twenty, depending on the specific needs of the study (Walz et al., 1991). Additionally, others argued that the number of experts engaged should match the required expertise and research scope (Grant et al., 1997).

On the other hand, the specific number of experts involved in the content validation process should not be rigidly determined, even though many studies typically involve on average 10 experts. This viewpoint is based on the challenge of achieving a unanimous decision within a large panel of experts. Conversely, having too few experts might result in limited information for the development of the instrument. Some authors suggest that an optimal number of experts is between 5 to 10. (Roebianto et al., 2023).

A statistical analysis approach was chosen to capture the level of agreement among founders on key factors that influence student startup success, allowing for a more objective analysis of consensus. Common descriptive statistics include minimum, maximum, range, mean, median, mode, standard deviation, and variance (Lee, 2020). This method is particularly useful for measuring the degree of consensus or divergence among respondents, offering a straightforward way to interpret founders' collective perspectives on the most significant factors impacting student-run startup success. This method allows for the analysis and comparison of different elements across the responses of the 10 founders.

Population and Sample. Engaging 10 experts offers a diversity of perspectives while remaining manageable in terms of data analysis and coordination. According to studies and scholars, including Rudzkiene (2005), it is posited that the evaluation of opinions from 10 experts correlates with a 95% reliability rate in their opinions. This approach is both efficient and sufficient for gaining a comprehensive understanding of the subject under study and for determining the validity of content. The literature review suggests that involving 10 experts is considered optimal for content validation purposes.

Questionnaire and results interpretation. 36 statements based on scientific literature revie were formulated. The statements were analyzed based on descriptive statistics. To better understand how founders of successful start-ups validated provided statements, several parameters were chosen to analyze deeper.

The choice to analyze the top 5 statements is a deliberate methodological decision that balances cognitive efficiency, practical significance, academic norms, and the need for focused, impactful communication of research findings. This choice is supported by established principles and practices in both quantitative and qualitative research.

Many empirical studies, particularly in social sciences, often highlight the top 5 findings to maintain consistency and comparability with existing literature. This approach allows for a focused discussion on the most significant results, facilitating a more efficient synthesis of findings across studies.

Data Collection. Invitations to participate in the survey were sent via the social network LinkedIn to the identified respondents. Participants were assured of the confidentiality of their responses. At the beginning of the survey, a consent form was provided, detailing the study's purpose, potential risks, benefits, and participants' right to withdraw. All respondents agreed to disclose the names of their startups for academic purposes, which include Careerfy, Wehelp, Podbase, PitchGround, SDK Finance, Boldr, WebKontrol, Bedrokk, StartupBlink, and Bitdegree. All startup founders were selected based on criteria indicating that they have either generated revenue or attracted venture capital investments, which demonstrates the validation of their business models and insights they provide.

Data Analysis. Quantitative data were analyzed using the MS Excel software package. Descriptive statistics, including mean, median, mode, standard deviation, skewness, kurtosis, sum, standard error, range, minimum, and maximum values, were computed for this analysis. This approach enabled the identification of which statements received the most agreement and disagreement among startup founders, as well as how the data (responses) were distributed across each statement.

Validity and Reliability. To ensure the content validity of the survey, a panel of experts from the fields of entrepreneurship and business research reviewed the survey. Feedback was incorporated to refine the questionnaire.

Ethical Considerations. This study adhered to ethical guidelines accepted in academic society and applied at Mykolas Romeris university. Personal identifiers were removed, and data were aggregated to ensure participants' anonymity. Respondents were informed of their rights and provided with contacts for any queries or concerns.

Limitations. This research may have several limitations. The findings may not be generalizable to all countries, types of universities or different academic disciplines such as natural sciences, technological sciences, social sciences and humanities. Universities in each field have their own characteristics and the findings should therefore be interpreted with caution. For example, the factors contributing to the success of start-ups may differ significantly between fields such as space technology, biotechnology and software technology. In the case of space or biotechnology start-ups, funding may be a critical factor, whereas it may be less critical for software start-ups. However, it is important to note that all the founders interviewed for this study were from the software start-up sector.

3. Conducting research and results

This section presents the findings of a study on the role of entrepreneurial ecosystems in universities and their impact on the success of student startups. As previously stated, the primary objective of the expert interviews was to ascertain the perceptions of experienced startup founders regarding the efficacy of universities in organizing entrepreneurial activities. A comprehensive analysis of the research results is further provided.

The findings of the research indicate the importance of practical knowledge, community connections, and favourable work environments. Table 1, which ranks factors crucial for startup success by founders, serves to illustrate the complex nature of student entrepreneurship. The top scores for "Teachers' previous experience in business/entrepreneurship," "Networking opportunities with experienced entrepreneurs," and "Physical space & infrastructure" emphasise the importance of practical knowledge, community connections, and favourable work environments. These findings highlight the necessity of supplementing academic theory, real-world experience, and tangible resources in order to foster entrepreneurial skills.

Similarly, "Workshops" and "Hackathon events" are valued for providing hands-on skill development, while "Focus on technology studies" and "Incentives for technological skills

teaching" reflect the critical role of tech proficiency in startups. The emphasis on "Trust in yourself" highlights the psychological aspect, suggesting confidence is as crucial as technical skills. The importance of "Networking opportunities with successful founders" and "Accelerator programs" underscores the value of guidance and support from the entrepreneurial ecosystem. Additionally, recognizing "Attitude to failure" points to the learning opportunities from setbacks, advocating for resilience.

Table 1. Ranking of key factors influencing startup success according to founders' agreement

No	Statements	Score	Top 5
7.	Teachers previous experience in business / entrepreneurship	44	1
19.	Networking opportunities with experienced entrepreneurs	44	1
25.	Physical space & infrastructure for students for startup activities (rooms, corner, labs, hubs etc).	44	1
17.	Workshops	43	2
2.	Incentives for technological skills teaching	42	3
4.	Focus on technology studies	42	3
15.	Hackathon events	42	3
31.	Trust in yourself	42	3
21.	Networking opportunities with successful founders	41	4
12.	Accelerator programs	40	5
30	Attitude to failure	40	5

Source: the authors' estimations.

Summarizing, the aforementioned key factors influencing startup success, as proposed by Founders, advocate for a comprehensive strategy to cultivate student entrepreneurship. This strategy integrates mentorship, technical proficiency, psychological resilience, and a supportive environment. Universities are pivotal in establishing ecosystems that integrate practical experience with theoretical knowledge. This approach prepares students not only academically but also mentally and socially for entrepreneurial success. This strategy is vital for fostering successful startups, emphasizing the necessity for academic institutions to provide experiential learning opportunities in addition to traditional education.

Furthermore, we conducted an analysis of the ranked factors that do not affect the success of the startup, as indicated by the founders.

Table 2 presents factors that founders perceive as less influential on the success of start-ups, offering unique insights into the field of university entrepreneurship. The factor with the lowest ranking, "Field of study," challenges the assumption that entrepreneurial success is exclusive to those with a background in business. This suggests that a more interdisciplinary approach may be beneficial. This indicates a recognition that innovation can originate from any field, thereby emphasizing the value of diverse academic backgrounds in fostering entrepreneurship. "Funding opportunities based on university budget" and "national, EU projects, grants" receiving relatively low scores imply that while funding is essential, the effectiveness of financial support may depend more on its relevance to the startup's specific needs rather than its source. This perspective underscores the importance of targeted financial support in startup ecosystems. The ranking of "Organized events by students" and "University memberships in various networks" points to the significance of networking and community initiatives. It reflects a belief in grassroots efforts and the value of external networks in offering support, suggesting that fostering a strong entrepreneurial community is crucial. Meanwhile, "Start-up studio" and "Student run incentives, internal motivation & attitudes" being ranked higher yet not top indicates their recognized value in providing structure and motivation within the entrepreneurial ecosystem. However, their positioning suggests that a successful startup

environment requires more than just motivation and infrastructure; it demands a comprehensive approach integrating cross-disciplinary learning, targeted funding, robust networking, and a supportive community to truly cultivate entrepreneurial success among students.

Table 2. The factors that do not affect the success of the startup, according to the interviewees

No	Statements	Score	Top 5
5.	Field of study (non-business students have less chance to create a successful start-up)	25	1
34.	Funding opportunities based on university budget	26	2
27.	Organized events by students	30	3
36.	Funding opportunities based on national, EU projects, grants	30	3
24.	University memberships in various networks (business angels associations etc)	32	4
14.	Start-up studio	33	5
26.	Student run incentives, internal motivation & attitudes	33	5

Source: the authors' estimation.

Summarizing, the data obtained from the research revealed that financial support and networking with investors are not regarded as pivotal factors for student startup success by experienced founders. This insight challenges conventional wisdom, suggesting that the foundation of a successful student startup lies beyond mere financial backing and investor connections. It highlights a shift in paradigm towards a greater emphasis on the intrinsic qualities of the startup idea, the team's execution capability, and the role of the educational ecosystem in fostering innovation and entrepreneurial skills. This perspective broadens the understanding of success, placing greater importance on knowledge, creativity, and the ability to navigate challenges, rather than on traditional metrics of financial support and networking with investors.

In the third step of the study, the variability in the perceptions of key success factors for startups within the university context was analysed. As Table 3 illustrates, an investigation into the variability in founders' perceptions of the key success factors for startups within universities yields significant insights. The scores, which represent standard deviation rates, indicate a diverse range of views on the factors that contribute to startup success. The highest variability was observed in the perception of networking opportunities with investors and private investments, which may reflect differing opinions on their importance and a nuanced understanding of how and when these factors impact startup success.

In close succession, the value of networking with successful founders, the role of start-up studios, and student-run initiatives exemplify a shared conviction in the significance of community, practical learning environments, and peer-led activities. Similarly, factors such as risk tolerance, ambition, and legal support demonstrate considerable, though not overwhelming, significance, underscoring the intricate nature of startup ecosystems within universities. The lowest variability in "Willingness to step out of comfort zone" indicates a more unified view on its essential role in entrepreneurial success.

Table 3. Variability in key startup success factors within a university

No	Statements	Score of SD	Top 5
20.	Networking opportunities with investors	1,54	1
35.	Private investments (Internal Fund, sponsors, corporates)	1,54	1
21.	Networking opportunities with successful founders	1,52	2
14.	Start-up studio	1,49	3
26.	Student run start-up & entrepreneurial clubs	1,49	3
28.	Risk tolerance, ambition, taking challenges	1,49	3
22.	Legal and regulatory support (for inst. Trade mark, patent, company registration, etc)	1,41	4
27.	Organized events by students	1,41	4
29.	Willingness to step out of comfort zone	1,31	5

Source: the authors' estimation.

In summary, our research data indicates that experienced founders consider networking with investors and securing funding to be the least agreed-upon factors for startup success within university ecosystems. This suggests a paradigm shift, indicating a preference for other elements such as teachers' experience and networking with experienced founders, rather than traditional financial avenues. Conversely, experienced startup founders are aware that financial support is not critical for success, particularly in the early stages of startup development. This insight challenges the conventional emphasis on capital, highlighting a broader understanding of success that encompasses fundamental qualities and the supportive role of the educational framework in fostering student startups.

In the second phase of the study, a consensus among startup founders on the critical factors for startup success in universities was analyzed.

The data presented in Table 4 reflects a consensus among founders on the crucial factors for student startup success within universities, with particular emphasis on the importance of cutting-edge technologies, hands-on workshops, supportive physical spaces, and specific funding opportunities. It was determined that the emphasis on physical space and infrastructure, in conjunction with educators' prior experience in business and entrepreneurship, is indeed significant. These factors not only demonstrated a high level of consensus among founders regarding their importance, but also exhibited one of the lowest standard deviations. This indicates a general consensus among respondents, suggesting that these factors are widely acknowledged as essential elements in the promotion of student-led startup entrepreneurship within universities. The provision of physical spaces and experienced teachers provides tangible and intangible resources that are crucial for fostering entrepreneurial initiatives. Therefore, their recognition across the board serves to reinforce their value within the academic entrepreneurial ecosystem.

On the other hand, the statement regarding university-based funding presents an intriguing dichotomy. The high level of disagreement on the importance of university-based funding, coupled with a low standard deviation, indicates that while there is a degree of variance in perceived importance, the opinions expressed are closely grouped, suggesting a strong consensus among certain subsets of respondents. This could imply that while university-based funding is crucial for some, others may not see it as a primary factor for startup success, possibly due to the availability of alternative funding sources or differing views on the role of financial support in early-stage ventures. This ambiguous understanding underscores the complexity of factors contributing to startup success and the need to consider a diverse range of perspectives when assessing the efficacy of support mechanisms within the university context.

Table 4. Consensus among startup founders on critical factors for startup success in universities

No	Statements	Score of SD	Top 5
6.	Access to the latest technologies on campus	0,67	1
17.	Workshops	0,67	1
25.	Physical space & infrastructure for students for startup activities (rooms, corner, labs, hubs etc.).	0,69	2
34.	Funding opportunities based on university budget	0,69	2
12.	Accelerator programs	0,81	3
7.	Teachers previous experience in business / entrepreneurship	0,84	5

Source: the authors' estimation.

At the end of the survey, interviewees were asked to share their insights through an open-ended question about how they believe universities can organize entrepreneurial activities to foster the development of student startups. The answers provide a diverse range of suggestions, reflecting the complex nature of start-up support within academic environments. A synopsis of the insights is presented below.

In response to an open-ended question, interviewee 1 placed significant emphasis on the importance of providing value to customers, rather than focusing on fundraising or outward appearances. This response reflects the conviction that startups should prioritise the development of products or services that offer tangible value to customers as the primary criterion for success, rather than relying on external funding or superficial metrics. This approach is aligned with the tenets of the lean startup methodology, which prioritizes customer value and iterative development based on feedback.

The interviewee 2 recommended that students be given leadership roles and practical learning experiences. The reference to 'learning by teaching' indicates an experiential methodology whereby students not only receive knowledge but also disseminate it, thereby potentially reinforcing their comprehension and abilities.

The response provided by interviewee 3 was intricate, suggesting that universities should engage students through activities such as speaking events, workshops, and competitions. Additionally, they proposed the provision of modest grants for projects, as opposed to merely ideas. This implies the existence of an ecosystem that rewards tangible action and implementation over mere conceptualization, which may contribute to the development of a more dynamic and entrepreneurial culture on campus.

Both interviewees 4 and 6 highlighted the potential for networking opportunities, albeit with differing emphases. The interviewee 4 advocated a proactive approach to capitalizing on these opportunities, whereas interviewee 6 advised that while networking through classes and clubs is beneficial, the driving force behind a company should be individuals who are willing to take risks, rather than educational programmes. This suggests that while networking is crucial, the impetus for establishing a start-up should originate from within and be spearheaded by students.

Subsequently, the input of interviewee 5 was noteworthy for its endorsement of learning through failure, proposing that launching a company should be an integral part of the educational experience. This reinforces the concept of 'failing forward', which posits that failure can be utilized as a pedagogical tool to cultivate resilience and pragmatic insights into the realities of entrepreneurship.

Next, interviewee 7 highlighted the value of corporate partnerships and accelerator programs, suggesting that connecting academic initiatives with industry resources and expertise could prove beneficial. Nevertheless, interviewee 8 reiterated this view, emphasizing the

importance of universities creating opportunities for engagement with stakeholders in students' fields of interest, which could facilitate mentorship, internships, or project collaboration.

Overall, the responses of the experts indicate a strong consensus on the necessity for universities to facilitate real-world experience, encourage the practical application of knowledge and foster an environment that values innovation and action. Moreover, there is a recurring theme that university support for start-ups should extend beyond traditional academic boundaries to include partnerships, networking and exposure to real business challenges and environments. These findings could inform university policy and study curricula design to create a more conducive environment for fostering future entrepreneurs.

4. Discussions

In recent years, the landscape of university entrepreneurship has been increasingly scrutinized, revealing critical factors that influence the success of student-run startups. Key among these are the previous business and startup experiences of teachers, the availability of physical space and infrastructure at universities, and the extent of networking with seasoned entrepreneurs. Notably, a consensus among successful startup founders highlights the substantial impact of educators' real-world experience on fostering student entrepreneurship, as indicated by its strong agreement and high rank in significance. Conversely, the role of funding, particularly from university sources, emerges as a surprisingly less critical factor. This finding aligns with previous research indicating that reliance on university financial support might inadvertently hinder the entrepreneurial process. Moreover, practical and experiential learning opportunities, such as workshops and hackathons, are increasingly favored over traditional academic approaches, emphasizing the shift towards a more hands-on, real-world approach in fostering entrepreneurial talent within academic environments.

The novelty of this research is encapsulated in several key points of discussion. The analysis of statements validation and the distribution of opinion provided by the founders of successful start-ups suggests the following insights for discussions and further developments:

- The most important factors that can contribute to creating more student-run start-ups at universities include i) teachers' previous experience in business and start-ups, ii) physical space and infrastructure at the university, and iii) increased networking with experienced entrepreneurs. Previous studies analyzed the factors and their role, this study provided a new perspective on entrepreneurial university ecosystem from the perspective of experienced startup founders. It is observed that founders highlighted the role of real- world experience in educational process. These findings are in line with previous research that claimed that educators previous experienced and role in educational process can significantly increase students' motivation and intention start and develop a startup or venture (Wraae et al., 2022; San-Martín et al., 2019;; Diegli et al., 2018, Seikkula-Leino et al., 2010).
- It is worth mentioning that there is a strong agreement among founders that teachers' previous experience in business and entrepreneurship is significant for student-run start-ups. This is evidenced by one of the lowest standard deviations among the top 5 factors and the highest ranking for "strongly agree."
- There is a weak agreement among founders that funding is an important factor for launching start-ups at university. Also funding opportunity factor even did not appear among top 5 the most important statements which founders' opinion aligned with.
- Networking with investors factor shows that there is a weak agreement among start-up founders. Moreover, founders did not prioritize it as one of the top factors contributing to start-up success. Supported by previous studies (Morris, 2017; Witt, 2004), it can be summed up that funding question never appears as the most important factor for launching a start-up.

- There is strong agreement among founders that funding opportunities based on university financial support has very little impact on launching student start-ups at universities. Surprisingly, some previous studies support such findings. Studies conducted by Schenkel (2013), Morris et al. (2017) claim that university financial support had a negative impact on the scope of student start-up activity. Because of limited funding, students which not received funding can simply give up on their entrepreneurial activities. On contrary, students who received financial support in the form of grant, loan, nonequity investment, equity investment could simply skip some significant stages of start-up development and try to spend funds in a less effective way.
- Additional activities such as workshops, hackathons, acceleration programs and studies focusing on the development of technological skills have been more prioritized by founders of successful start-up than entrepreneurial activities or entrepreneurial studies itself. These approaches related more to "learning by doing" or "experiential learning" methods than traditional studies in the classrooms. Student start-up activities should step out of the traditional way of learning business disciplines. Such findings are supported by previous studies (Monllor, 2024; Morris et al., 2017; Mason et al., 2013). Additionally, as stated by van Gelderen (2023), students need to step out of their comfort zones because the most significant learning occurs when they encounter surprises.

These findings could provide a foundation for universities to prioritize resources in creating entrepreneurial policies and frameworks for venture creation. Standard academic education in entrepreneurship, particularly for building technology-based startups, necessitates the integration of startup culture and its dynamics into the curriculum itself. Slow, inflexible, and bureaucratic institutions often fall short in fostering the creation of dynamic and adaptable ventures like startups. In these traditional environments, the ability to quickly adapt and innovate is hindered, posing a significant challenge for fostering successful entrepreneurial ventures. To bridge the gap, it is crucial to empower students to embrace failures and learn from them, a fundamental aspect of the entrepreneurial journey. The shift in focus from the rigid structures of conventional education to a more failure-tolerant and flexible learning approach marks a vital transition. It underlines the need for educational systems to evolve, fostering resilience and adaptability in students, which are essential traits for success in the fast-paced and ever-changing world of startups.

Figure 2 illustrates student-run startup development stages from the perspective of experienced founders. The development of student startups can be conceptualized as a continuous, multi-stage process. Based on the descriptive statistical analysis, three key stages emerged, each highlighting the importance of human, social, and financial capital in varying degrees throughout the startup lifecycle.

In the first stage, human capital forms the bedrock of startup creation. Experienced founders emphasize that human capital—comprised of professors' entrepreneurial experience, students' entrepreneurial mindset, risk tolerance, self-confidence, and willingness to step outside comfort zones – is critical to early startup success. Hands-on experiences, such as participating in workshops, hackathons, and pitching competitions, further solidify this foundation by equipping students with practical skills and experiential learning. This human capital is the most significant factor in laying the groundwork for a startup, providing the essential skills and attitudes necessary for entrepreneurial success. Importantly, this finding aligns with established theories of entrepreneurship, which emphasize the role of personal competencies and education in venture creation (Elenurm et al, 2015; Shane et al., 2000). Therefore, this stage underscores the pivotal role of human capital in the early stages of startup development, where the right mindset, skills, and expertise act as key drivers of entrepreneurial activity.

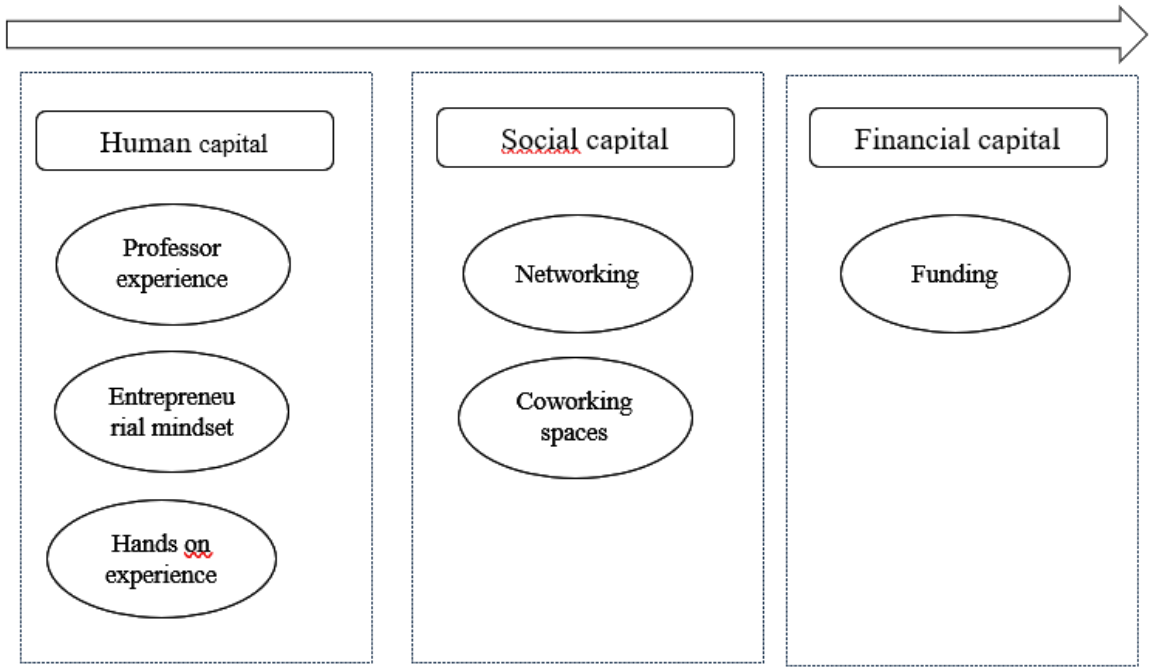

Figure 2. Entrepreneurial University Ecosystem Framework for Student-Run Startups
Source: the authors.

The second stage involves the accumulation of social capital, which founders view as crucial in building strong networks. Social capital is primarily gained through networking opportunities with other entrepreneurs and collaborative workspaces such as coworking hubs. These interactions facilitate knowledge sharing, resource access, and team collaboration, contributing to a sense of community. Importantly, experienced founders suggest that networking with seasoned entrepreneurs is more valuable than networking with investors at the early stages. These finding challenges conventional wisdom that investor connections are key from the outset. The insight provided by founders suggests that networking with investors is less effective until a business idea or model is sufficiently proven or validated. This reflects the reality that investors typically seek startups with established traction or clear potential, aligning with studies that highlight the importance of validated business models in attracting investment (Stam et al., 2014). Consequently, the role of coworking spaces extends beyond just physical infrastructure; they act as catalysts for deeper social interactions and collaborative efforts among startup teams, enhancing social capital.

In the third stage, financial capital becomes relevant. While financial support mechanisms such as grants, EU funding programs, and private investments are often considered crucial, this study finds that founders place relatively less importance on these resources in the early stages. The consensus suggests that financial capital, while necessary, typically becomes more critical in later stages of startup development when scaling and expansion require substantial investment. This delay in the need for financial resources may be partly attributed to the advent of modern technologies—such as AI and non-code tools—that allow startups to develop initial prototypes and validate business ideas with minimal financial outlay. These technologies significantly reduce the financial barriers to entry, enabling students to move through the initial stages of development without the need for large-scale funding. Therefore, the role of financial capital is recontextualized as a later-stage necessity, rather than an immediate prerequisite for startup formation. This aligns with recent research suggesting that,

for early-stage startups, financial constraints are less burdensome than previously assumed (Rocha et al., 2024).

Summing up, this multi-stage model highlights a progression in capital requirements, where human capital lays the foundation for entrepreneurial activity, social capital enhances collaborative opportunities and community-building, and financial capital becomes necessary primarily in later stages. This perspective is critical for understanding the sequential nature of startup development and reflects the nuanced role each form of capital plays throughout the process. Moreover, the study's findings offer a novel perspective on the perceived value of non-financial resources, particularly in early-stage university-based startups, providing actionable insights for educators, policymakers, and startup ecosystem builders. The practical implications emphasize that universities should prioritize human and social capital development — through educational programs, hands-on learning, and networking opportunities — before focusing on financial support.

Conclusion

This paper contributes to the growing field of entrepreneurial university research by structuring the existing literature and identifying critical elements that have been the focus of scholarly attention. These elements encompass a broad range of factors influencing student-led startups, including formal and informal educational programs, support mechanisms like pre-accelerators and accelerators, personal traits and intentions of student entrepreneurs, and the impact of alumni and family backgrounds on entrepreneurial activities. Our analysis underscores the inherent complexities of startup creation within academic contexts, traditionally perceived as theoretical rather than practical environments.

Theoretical contribution. The study makes critical theoretical contributions by advancing the understanding of university startup ecosystems, particularly through the lens of experienced founders. It identifies key factors such as professors' prior entrepreneurial experience, networking, and community-building as foundational to the success of student-run startups. Given the scarcity of literature focused on founders' perspectives within university ecosystems, this research fills a significant gap by providing insights on how experienced entrepreneurs perceive and prioritize support mechanisms in academic environment. Additionally, the findings reinforce and expand upon social and human capital theories, emphasizing their crucial role in the early stages of student-led ventures, thus challenging the overemphasis on financial capital in traditional models of startup development.

Practical implications. The practical implications of the research offer insights for universities seeking to enhance their entrepreneurial ecosystems. By highlighting the importance of professors' entrepreneurial experience, networking opportunities, and community-building, universities can prioritize these elements to better support student-run startups. The findings suggest that universities should invest more in fostering human and social capital—such as hands-on experience and collaborative spaces—rather than focusing solely on financial resources. This shift can lead to more sustainable and innovative startups, especially in the early stages, aligning resources more effectively with the real needs of student entrepreneurs.

Managerial implications. The managerial implications of the research suggest that university administrators and policymakers should focus on reallocating resources to strengthen non-financial support mechanisms within the entrepreneurial ecosystem. Specifically, universities should prioritize programs that enhance professors' entrepreneurial engagement, facilitate networking with experienced entrepreneurs, and foster community-building through coworking spaces and experiential learning opportunities like workshops and hackathons.

Rather than emphasizing financial capital in the early stages, managers should recognize that human and social capital play a more pivotal role in the development of student-run startups. By aligning managerial strategies with these findings, universities can more effectively cultivate a vibrant startup culture that encourages innovation and long-term growth.

Limitations of the research. Several limitations may affect the applicability of the study's findings. Its conclusions may not be universally applicable across different nations, university models or academic fields, including natural and technological sciences as well as social sciences and humanities. Given the specificity of each academic field, the findings of the study should be considered with caution. In particular, the elements that facilitate start-up success may vary significantly between disciplines such as space technology, biotechnology and software development. Given these limitations, future studies should focus on examining specific university models, academic disciplines or startup industries, so that universities can tailor their entrepreneurial ecosystems accordingly.

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Appendix

Statements provided to founders of successful start-ups for validation

1. Availability of Bachelor programs in start-ups & entrepreneurship (start-ups)
2. Incentives for teaching technological skills
3. Focus on technology studies
4. Focus on entrepreneurship studies
5. Field of study (non-business students have less chance to create a successful start-up)
6. Access to the latest technologies on campus
7. Teachers previous experience in business / entrepreneurship
8. Entrepreneurial atmosphere / culture (administration attitude, strategic documents, mission, vision, general attitude toward start-ups)
9. Supportive faculty and staff for entrepreneurial activities

University scientific research engagement in start-up, innovation, entrepreneurial international projects

10. Pre-accelerators
11. Accelerator programs
12. Incubators
13. Start-up studio
14. Hackathons (entrepreneurial competitions)
15. Entrepreneurial conferences
16. Workshops
17. Summer start-up bootcamps
18. Networking opportunities with experienced entrepreneurs
19. Networking opportunities with investors
20. Networking opportunities with successful founders
21. Legal and regulatory support (for inst. Trademark, patent, company registration, etc)
22. Networking with entrepreneurial alumni
23. University memberships in various networks (business angels associations etc).
24. Physical space & infrastructure for students for startup activities (rooms, corner, labs, hubs etc.).
25. Students run start-up & entrepreneurial clubs
26. Organized events by students
27. Risk tolerance, ambition, taking challenges
28. Willingness to step out of comfort zone
29. Attitude to failure
30. Trust in yourself
31. Industry experience (accumulated working experience)
32. Entrepreneurial parents / family
33. Funding opportunities
34. University budget
35. Private investments (Internal Fund, sponsors, corporates)
36. Project based (national or EU projects), grants