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HOW DO ENTREPRENEURIAL PRE-INCUBATION PROGRAMS WORK?

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1. INTRODUCTION

1.1. Overview of the dissertation

In recent years, there has been a growing interest in pre-incubation programs by scholars in the field of entrepreneurship education and training (Davey et al., 2016). Pre-incubation programs have become increasingly crucial for cultivating skills (Baggen et al., 2017) and stimulating entrepreneurial behaviors (Arias et al., 2018). At the same time, they play a key role as a bridge between public policy expenditures and new firm creation (Lamine et al., 2018). A pre-incubation program is defined as a facility that supports embryonic business (before birth) by providing training and support for aspiring entrepreneurs and startup teams during their planning stage (Bielicki, 2023). Their primary goal is to support the process of creating new businesses, including university spin-offs. This task can be achieved by providing a safe environment in which individuals can test and develop their business ideas before founding a company (Wirsing et al., 2002). Given the growing importance of pre-incubation programs in providing training and the increasing focus of scholars on entrepreneurship education in general (Rideout & Gray, 2013), pre-incubation programs have taken various forms. The main challenge regarding empirical evidence revolves around the effectiveness of these programs, which to date remains inconclusive (Souitaris et al., 2007; Elert et al., 2015).

Based on the previous literature, we know that training initiatives by pre-incubation programs are influenced both by organizational and institutional context (Gupta & Etzkowitz, 2021; Secundo et al., 2021). Factors such as pre-incubation programs' governance or business model (Ting et al., 2017; Breznitz & Zhang, 2021; McGee et al., 2021) are important antecedents influencing the type and heterogeneity of entrepreneurship education and training contents. Typically, the pre-incubation of new business ideas starts with the selection of the supported entrepreneurs (Secundo et al., 2021; Blank, 2021), followed by the elaboration of a business plan to verify the feasibility of the project and test market needs (Bezerra et al., 2017). The type of training that pre-incubation programs offer to their participants can have a practical (e.g., coaches, trainers, mentors) (Jones et al., 2021), theoretical (e.g., lectures), or a mixed-method approach (e.g., seminars, case studies, project-based activities) (Kolade, 2018; Secundo et al., 2020). Depending on the methodology used in the programs, learning will be individual or rather take place in a team. Prior studies analyze the alignment between goals, content and learning outcomes for participants. As suggested by the study of McGee et al. (2021),

individuals should, for instance, conduct self-assessment of their future development through periodic review panels (Patton & Marlow, 2011), demonstrations of the acquisition of theoretical knowledge (e.g. written tests, oral examinations) or practical demonstrations of skills (Kolade, 2018). Recent studies have emphasized the importance of the outcomes of exposure to pre-incubation programs, at the individual (Passaro & Thomas, 2017; Wolf, 2017; Guerrero et al., 2018; Kolade, 2018; Mayorga, 2019; McGee et al., 2021; Stephens & Cunningham, 2021) and firm level of analysis (Souitaris et al., 2007; Elert & Wennberg, 2015; Lyons & Zhang, 2018; Åstebro & Hoos, 2021). Despite this, evidence for the effectiveness of pre-incubation programs is not unanimous and often stems from the type of support they offer (Åstebro & Hoos, 2021). These programs shown to produce different results: from no treatment effects (Souitaris et al., 2007), to a decrease in entrepreneurial intention (Oosterbeek et al., 2010), or positive effect on new firm creation (Lyons & Zhang, 2018). Consequently, empirical evidence of the impact of pre-incubation treatment is inconclusive (Elert et al., 2015).

To date there are still several gaps in the understanding of pre-incubation programs that deserve further investigation. First, there is a lack of comprehensive studies that cumulate and synthetize knowledge on entrepreneurship teaching and learning in of pre-incubation programs. Second, there is an urgent need for insights into the learning dynamics within the entrepreneurship training courses offered by pre-incubation programs (Patton and Marlow, 2011). Longitudinal studies that follow individuals on their entrepreneurial journey, taking a process-oriented approach, are particularly scarce (Wright & Mustar, 2017). A comprehensive understanding of mechanisms of entrepreneurial learning is critical to understand the effectiveness of the program (Metcalf et al., 2021; Stolz & Sternberg, 2022). Third, evidence regarding the effectiveness of pre-incubation programs in terms of new firm creation remains inconclusive and often depends on the nature of the support provided (Åstebro & Hoos, 2021). These conflicting findings suggest that the effectiveness of pre-incubation programs may depend on boundary conditions that previous studies have not yet investigated. These studies should employ robust statistical techniques to delve into causality and explanatory mechanisms (e.g., Camuffo et al., 2020).

This dissertation aims to fill the above-mentioned gaps in literature. To achieve this goal, it collects data from Start Cup Emilia-Romagna, a six-month pre-incubation program. During this period, participants receive support through entrepreneurship training, one-on-one meetings with mentors, and organized sessions with potential customers and other local

partners. Data comes from a variety of sources, including archival documents, observations, interviews, and surveys, as well as from Aida Bureau van Dijk and Italian Chamber of Commerce databases. The data were analyzed using qualitative and quantitative methods to answer the following questions:

- RQ1. What factors motivate and influence entrepreneurship teaching and learning in the context of entrepreneurial support organizations, and what are the outcomes?
- RQ2. Do career preferences of early-career academics drive entrepreneurial learning in pre-incubation programs?
- RQ3. Do pre-incubation programs foster new venture creation? If yes, how?

This work aims to contribute to several streams of literature. First, it aims to contribute the existing literature on entrepreneurial education (Davey et al., 2016) and entrepreneurial ecosystem (Stam & Van De Ven, 2021). Second, it aims to enrich to the literature on entrepreneurial learning in pre-incubation programs (Williams Middleton & Donnellon, 2014; Redondo & Camarero, 2017; Ting et al., 2017; Wolf, 2017). Finally, it aims to contribute more broadly to the literature on whether and how pre-incubation programs work (Hallen et al., 2020).

1.2. Research Outputs

The dissertation consists of four research outputs. The first output is a systematic literature review (Paper I) titled *"Entrepreneurial Support Organizations as a Learning Space*." It answers the question: *What factors motivate and influence entrepreneurship teaching and learning in the context of entrepreneurial support organizations, and what are the outcomes?* This study aims to provide a comprehensive overview of current knowledge on entrepreneurship education and training provided by entrepreneurial support organizations, including pre-incubation programs, incubator, and accelerator. It aims to contribute to the flow of literature on entrepreneurial education and entrepreneurial ecosystem. To do so, it uses a *Systematic Literature Review* (Kraus et al., 2020) of entrepreneurship education and training in entrepreneurial support organizations. In line with methodological recommendations to ensure the rigor and transparency of literature reviews, sampling was created using the Web of Science (WoS) database, retrieving 448 records. After coding for inclusion or exclusion of the articles (Mustar, 2009; Sternberg, 2012; Bank & Klofsten, 2017; Van Sebille, 2018; Ahmed et al., 2020; Beyhan & Cetindamar, 2021; Tam & Chan, 2021) and after a careful reading of them, the final

sample of articles included in the review consists of 64 peer-reviewed documents. The study uses the PRISMA methodology to represent the three-stages of the data collection process.

The second output is part of a policy report entitled *"Start Cup Emilia-Romagna: Stylized Facts, Prospects and Impact"*. The paper outlines the research context in which the dissertation was developed, along with some descriptive statistics of the sample. This study exploits longitudinal data of individuals who applied to the Start Cup Emilia-Romagna program in the years 2017, 2018, and 2019 (both those accepted and those rejected), characterizing their possible entrepreneurial careers and the characteristics of their companies. The information on the individual level comes from the documentation received from ART-ER. At the same time, the characteristics of the companies were extrapolated from the Aida Bureau van Dijk database and complemented with the Italian Chamber of Commerce source.

The third output is a qualitative study (Paper II) titled "*Do career preferences of early-career academics drive entrepreneurial learning in pre-incubation programs?"* It explores whether career preferences among early-career academics drive their entrepreneurial learning in pre-incubation programs. It contributes to the literature on entrepreneurial learning in pre-incubation programs by expanding existing knowledge on the learning mechanisms that occur in these contexts. To do this, the study uses a longitudinal case study methodology because it allowed for in-depth investigation of the structure of the pre-incubation program and observation of participants' behavior. The research context of the present study is Start Cup Emilia-Romagna 2022. For the data collection process, the study followed standard recommendations for ethnographic work (Van Maanen, 1979) and combined archival documents, participant observations, semi-structured interviews, informal interviews, and surveys, then integrated through triangulation (Yin, 2009).

The fourth output is a quantitative study (Paper III) titled *"How Do Pre-Incubation Programs Foster New Venture Creation? Evidence From a Regression Discontinuity Design*." This study estimates the effect of pre-incubation treatment on subsequent business creation. To this end, it uses a quasi-experimental research design to identify the causal effect of pre-incubation treatment on subsequent business creation. The study uses information obtained directly from Start Cup Emilia-Romagna (for the 2017, 2018, 2019, and 2020 editions), including project scores and applicant characteristics. Complete longitudinal data are collected for both the treatment and control groups. To improve the dataset, it supplements this information with data on business creation from the Aida Bureau van Dijk and Italian Chamber

of Commerce databases.

In the dissertation, the four chapters are intricate, each building on the other to provide a comprehensive exploration of the dynamics within pre-incubation programs and their impact on new venture creation. The systematic literature review (Paper I) lays the groundwork by offering an in-depth examination of the state-of the art of entrepreneurship education and training provided by pre-incubation programs, incubators, and accelerators. The qualitative study (Paper II) delves into the mechanisms underlying entrepreneurial learning in pre-incubation programs, exploring how career preferences of early-career academics influence the learning process within these contexts. Based on the knowledge gained from the literature review and the qualitative paper, the quantitative paper (Paper III) goes a step further. It assesses the effectiveness of pre-incubation programs in fostering new venture creation. The inclusion of the policy report in the thesis aims to deepen the research setting of the two empirical studies by providing an overview of the sample and analyzing the content of the training, the timing with which the program is delivered, and the key actors involved (coaches, mentors, external consultants), identifying some of the dynamics through which the program is most effective. This helps to provide practical insights for pre-incubation program managers and policymakers. Collectively, the findings of this research form a cohesive narrative, with each chapter contributing a unique perspective and advancing our understanding of the multifaceted relationship between pre-incubation programs, entrepreneurship education and training, and new venture creation.

1.3. Structure of the dissertation

The dissertation comprises six chapters. The first chapter offers an overview of the entire dissertation. In the second chapter, a systematic literature review is presented, focusing on entrepreneurship education and training provided by entrepreneurial support organizations, which include pre-incubation programs. Chapter three delves into the research context, specifically examining Start Cup Emilia-Romagna. Chapters four and five introduce the two empirical papers of the dissertation. Finally, the sixth chapter contains the conclusions.

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2. PAPER I – LITERATURE REVIEW

Entrepreneurial Support Organizations as a Learning Space[1]

ABSTRACT

This research aims to offer a comprehensive overview of the current knowledge on entrepreneurship education and training offered by entrepreneurial support organizations (ESOs). Conducting a systematic literature review of 64 peer-reviewed articles on the topic, we bring together the factors that motivate and influence the variety of entrepreneurship teaching and learning initiatives in ESOs, together with its outcomes. We offer a new and robust analytical model and propose a research agenda to address the existing gaps and advance knowledge on the topic. The findings of this work provide several insights contributing to the streams of literature on entrepreneurial ecosystem and entrepreneurial education, together with policy and practice recommendations.

Keywords: systematic literature review; entrepreneurial support organizations; entrepreneurship education and training; entrepreneurial learning; pre-incubation programs

[1] Previous version of this paper has been presented at: Boosting Entrepreneurial Skills and Mindsets conference (University of Bologna & Engage Centre - NTNU, Norway) in March 2021; Friends of Imperial Conference (University of Bologna & Imperial College, London) in June 2022; R&D Management PhD Colloquium (in Trento, Italy) in July 2022; 3E - ECSB Entrepreneurship Education PhD Colloquium (Aarhus University, Denmark) in May 2023, co-authored with Daniela Bolzani. This paper is now co-authored with Daniela Bolzani and Rosa Grimaldi.

2.1. Introduction

Entrepreneurship education and training programs are on the rise (McKenzie, 2021) and have gained increasing scholarly attention (Rideout & Gray, 2013). They are seen as tools to stimulate entrepreneurial mindsets and competencies in individuals, supporting them to create and act on business opportunities and generate ventures that bring local employment and economic growth (Cohen et al., 2019). Over the last decade, entrepreneurship education and training have taken various forms, also thanks to the impulse of a growing number of public and private initiatives that we will refer to below as entrepreneurial support organizations (ESOs), including pre-incubation programs, incubators, and accelerator (Bergman & McMullen, 2022). ESOs intervene at various stages of the entrepreneurial journey: pre-incubation programs in the conception phase of the business idea (Bielicki, 2023); incubators in the development and pre-seed phase (Assenova, 2020); accelerators in the go-to-market and seed phase (Cohen et al., 2019). These organizations offer different services to (nascent) entrepreneurs such as physical space and resources, administrative support, networking, training, and education (Lyons & Zhang, 2018).

The engagement of ESOs as providers of entrepreneurship education and training, also in collaboration with formal education institutions (Metcalf et al., 2021; (Stolz & Sternberg, 2022) poses important questions about how entrepreneurship is taught outside formal education institutions and how participants learn in these contexts. However, despite the relevance of this phenomenon, the literature is still fragmented. In this work, we thus cumulate and synthesize knowledge about entrepreneurship teaching and learning in the context of ESOs. We aim at addressing the following RQ: *What factors motivate and influence entrepreneurship teaching and learning in entrepreneurial support organizations, and what are the outcomes?*

This work provides important insights into the contextual dimensions of entrepreneurial education and training for (aspiring) entrepreneurs, by moving the focus outside the traditional classroom and beyond active learning approaches targeting students and youngsters (Kirby, 2006). Our research contributes to the literature on entrepreneurial ecosystems (Stam & Van De Ven, 2021) and entrepreneurial education (Pittaway & Cope, 2007). It offers two sets of practical implications: one for managers of entrepreneurship support organizations, the other for policy makers.

2.1.1. Delineating education and training in the context of ESOs

Liñán (2004, p. 163) defines entrepreneurship programs as «the whole set of education and training activities -within the educational system or not- that try to develop in the participants the intention to perform entrepreneurial behaviors, or some of the elements that affect that intention, such as entrepreneurial knowledge, the desirability of the entrepreneurial activity, or its feasibility. » Over the last decades, entrepreneurship education programs in schools and universities have testified a growing interest (Brüne & Lutz, 2020). Similarly, we are witnessing a sharp increase in the availability of entrepreneurship training programs promoted by a variety of organizations, such as pre-incubators, incubators, and accelerators (e.g., Williams Middleton & Donnellon, 2014; Redondo & Camarero, 2017; Hallen et al., 2020). These organizations can be defined as "entrepreneurial support organizations" which, building on Bergman & McMullen (2022, p.3), have the primary purpose "to support individuals and collectives, through (in)direct and (im)material assistance, as they seek to initiate and progress through the stages of the entrepreneurial process." Such organizations provide spaces that can be seen as "teaching laboratories" (Kirby, 2006) where it is possible to link business practices with academic theory (Rideout & Gray, 2013).

Indeed, entrepreneurship education and training programs have been categorized into three main approaches: "about", "for", and "through" (Pittaway & Cope, 2007; Pittaway et al., 2009). Teaching "about" entrepreneurship is defined as a content-laden and theoretical method to give a general understanding of the phenomenon (Lackéus & Williams Middleton, 2015), and it is mainly used in the formal educational system. Teaching "for" entrepreneurship is defined as an employment-oriented approach whose purpose is to provide individuals with the knowledge and skills valuable for an entrepreneurial career (Wei et al., 2019).Teaching "through" means a process-based and experience-based approach in which students are involved in an entrepreneurial learning process. From these distinctions, the "about" and "for" approaches can be defined as "supply" model pedagogies, focusing on transmitting knowledge to students (Nabi et al., 2017),whereas the "through" entrepreneurship teaching approach, adopting a "demand" or "competence" model pedagogy (Nabi et al., 2017), is more in line with active and pragmatic learning approaches which allow students to gain concrete experience and test implications of concepts into new situations (Kirby, 2006) with the focus on 'learning through doing' (Pittaway & Cope, 2007). To date, the literature has not systematically investigated what approach to education and training, among these types, is maintained by

different ESOs. However, we suppose that these organizations, given their mission, are faced with the necessity to provide experiential, hands-on programs focused on students' needs and interests, contact with external experts, and networking in business and industry environments. We believe that opening the black box of what happens inside education and training initiatives provided by ESOs can provide both theoretical and practical insights to improve these crucial forms of support, which are now available worldwide.

2.2. Review Method

For this study, we use a systematic literature review (Kraus et al., 2020) of entrepreneurship education and training in entrepreneurial support organizations. In line with the methodological recommendations to ensure rigor and transparency in literature reviews, we followed four steps: (1) Sample generation; (2) Sample screening; (3) Coding; and (4) Analysis. First, we created our sampling using the Web of Science (WoS) database, searching twelve queries in total, which included keywords related to the topic of entrepreneurial support ("incubat*"; "accelerator*"), matched with keywords on the field of entrepreneurship education and training ("entrepr*"; "entrepr*"; "educat*"; "train*"; "learn*") in the title, keywords, or abstract. We limited our search to academic journal articles written in English. The twelve queries retrieved 448 records published between January 1993 and February 2024, when the review was refined. After removing the duplicates, the sample consisted of 444 records.

To screen the articles, the first two authors reviewed the first 50 articles' abstracts to delineate a common strategy to include or exclude them for further review. To do so, they coded separately for inclusion or exclusion of the 50 articles, reaching an inter-rater agreement of 84%. All the authors then compared and discussed their criteria for coding, solving disagreements to determine a common procedure to exclude from the sample those articles that did not match the study purpose. These cases regarded: (1) articles that did not have a specific focus on entrepreneurship education and training in ESOs (Sternberg, 2012); (2) articles focused on how to design effective entrepreneurial training (Mustar, 2009); (3) studies on university or high school courses for students (Van Sebille, 2018); (4) articles focused on explaining only the process of selection in business accelerators (Beyhan et al., 2024); (5) articles on social entrepreneurial training (Tam et al., 2021), social incubators (Bank et al., 2017) and sustainable entrepreneurship (Ahmed et al., 2022). Following these rules, the first author then proceeded to code for the inclusion/exclusion of the remaining 337 abstracts

extracted from the search, reducing the sample to 83 articles.

To analyze the sampled articles, we proceeded to the in-depth reading of each of the 83 articles, developing a coding process aimed at describing the methods and contents of the papers, understanding the main topics investigated and the major findings, and suggesting further avenues for research. Specifically, we organized the discussion topics into three categories. The first, "Antecedents of entrepreneurship education and training in ESOs", could be theoretically located at different levels of analysis: organizational, and institutional. Acting as a bridge between antecedents and outcomes are the "Variety of entrepreneurship education and training programs in ESOs" (second category), such as selection practices, temporal extension, teaching methodologies, and assessment methods, which might influence individual learning. Finally, we identified papers dealing with the "Outcomes of entrepreneurship education and training programs in ESOs", representing the third category. These outcomes can be related to individual and organizational outcomes.

After a thorough reading, the final sample of articles included in the review consists of 64 documents. 19 articles were outside the scope of the study, such as (1) studies that analyzed how the reliance on students' network ties impacts entrepreneurial learning activities and new venture performance (Sullivan et al., 2021); (2) papers about the mechanisms undertaken by ESOs to attract talent for their tenants' companies (Cadorin et al., 2020); (3) studies about internal and external network analysis of incubators (Wu et al., 2021). The data collection process is summarized in Figure 2.1.

– – Insert Figure 2.1 about here – –

2.2.1. Overview of the included studies

In this section, we offer a descriptive overview of the 64 papers included in our sample. The articles were published between 2011 and 2024, with one peak of scientific productivity in 2017 (N=10) and a steadily growing trend in time, showing that the topic has gained increasing academic attention over the last decade (Figure 2.2).

-- Insert Figure 2.2 about here --

As shown in Table 2.1, the literature is very fragmented, with the top 10 journals comprising 28 out of 64 articles (44%). The field of research is heterogeneous and includes

management, entrepreneurship, economics, and educational research, among others.

-- Insert Table 2.1 about here --

As shown in Table 2.1, less than 10 percent of the papers included in the sample (5 out of 64) are conceptual: two of these are literature reviews, and three are theoretical. It is here important to underline that our work differentiates from the two available reviews of the literature because our review focuses explicitly on entrepreneurial education and training in ESOs, whereas the available reviews analyze the historical evolution of services provided by ESOs (Jones et al., 2021), increasingly focused on education and training as a fundamental role in entrepreneurial ecosystems (Lamine et al., 2018). Most of the articles included in our review are empirical (59 out of 64). Of these, 24 out of 59 (41%) adopt a qualitative approach: 50% of them use a single case study approach, 38% a multiple case-study research methodology, and 13% ethnographical designs; 23 out of 59 adopt a quantitative approach, predominantly use some form of regression. In the theoretical approach, most articles do not use a specific reference theory. The only 25 articles that are theory-based, are rooted in cognitive literature, e.g., social cognitive or learning theory (Bandura, 1999), theory of planned behavior (Ajzen, 1991), or human capital theory (Becker, 1992). Among the empirical articles, those using a mixed-methods approach are in the minority (12 out of 64), offering an interesting triangulation of various data sources (interview, survey, archival, observation). Surveys or interviews are the most used instrument to collect data in empirical papers, for example, to explore the characteristics of individuals receiving the treatment and the results of exposure to distinct types of education and training (Zhao et al., 2022). However, only one study (Miles et al., 2017) uses the pre-test and post-test survey design.

-- Insert Table 2.2 here --

2.3. Review Findings

As described in the methodological section, we have identified two themes that motivate and influence entrepreneurship teaching and learning in the context of entrepreneurial support organizations, and their outcomes, as shown in the analytical model presented in Figure 3. We describe our findings in the following sections.

– – Insert Figure 2.3 about here – –

2.3.1. Antecedents of Entrepreneurship Education and Training in ESOs

2.3.1.a. Organizational level

The articles coded as belonging to this category deal with the governance and business model of ESOs. In some studies (e.g., Secundo et al., 2020; Gupta & Etzkowitz, 2021), it is clear how the public governance structure influences the type of entrepreneurship education and training programs offered by pre-incubation programs. Collaboration among the different actors in this stakeholder network fosters local growth, as it involves the availability of human resources, physical spaces, and networks of relationships (Cohen et al., 2019). This aligns with the third mission activities of universities, which play a key role in promoting local development, by stimulating new entrepreneurial initiatives. While entrepreneurs and managers emerge as key players, interdisciplinary collaboration among academic teams in pre-incubation programs facilitates the exchange and enrichment of knowledge and experience. Interestingly, students with previous exposure to entrepreneurship courses or entrepreneurial experience are more likely to successfully bring nascent ideas and projects to fruition. At the same time, McGee et al. (2021) stress the importance of understanding how the public governance structure plays a crucial role in such programs' design. For example, when the primary objective is to stimulate entrepreneurial competencies in individuals, entrepreneurship education and training programs are designed with an action-based approach to allow individuals to gain knowledge and understanding about what and who is important when trying to act entrepreneurially (Williams Middleton & Donnellon, 2014).

2.3.1.b. Institutional level

Intending to increase employment at the local level through the creation of innovative start-ups (McKenzie,2021), institutions implement policies to disseminate entrepreneurship education and training courses by ESOs. The institutional level is crucial to the development of entrepreneurial ecosystems, where pre-incubation programs, incubators, and accelerators, become bridges between entrepreneurship education, experiential knowledge, and regional development (Lamine et al., 2018).

The papers looking at the factors influencing the emergence of entrepreneurship education and training by ESOs often employ the concept of the entrepreneurial ecosystem to analyze the actors - such as government or educational institutions– that are involved in the

process (Cohen et al., 2019; Tripathi et al., 2019). Governments play a vital role in promoting value creation within local areas by relying on human capital to drive innovation, particularly in sectors with significant innovation needs (Piqué et al., 2020). Therefore, governments make connections with key players in the entrepreneurial ecosystem, such as universities, to create ESOs that can spread entrepreneurial learning and promote human capital development (Fong, 2020; Jones et al., 2021). Empirical evidence from (Breznitz & Zhang, 2022) confirms the collaborative efforts of governments and institutions in establishing pre-incubation programs, underscoring the role of ecosystem networks in facilitating the generation of new widespread knowledge. Indeed, ESOs serve as vital channels between entrepreneurship education, experiential knowledge, and regional development (Lamine et al., 2018).

When the goal of institutions is economic development, some papers underline that entrepreneurship education and training should be particularly sustained in the rural context, as it is a means of creating economic activity and is important for the development of these regions (Hagebakken et al., 2021). Another case is illustrated by Kapinga et al. (2018), who emphasizes that in the context of a developing country, where participants enter with minimal knowledge of how to market their products and the financial tools needed to start a business, entrepreneurial teaching should be revised to meet the specific needs of the local population and participants.

However, ESOs might fail to provide equitable access to entrepreneurial training and education opportunities for all. For instance, minorities facing discrimination in the domain of business and entrepreneurship or structural discrimination (e.g., women, people of color, disabled individuals) might be impaired in accessing, attending, and completing these programs (e.g., Kapinga et al., 2018).

2.3.2. Variety of Entrepreneurship Education and Training in ESOs

The studies included in this category provide an overview of the variety of training and education initiatives carried out by ESOs, concerning four issues: (1) Selection of supported entrepreneurs; (2) Methodologies and target groups; (3) Temporal development of the program; (4) Assessment of entrepreneurial learning.

2.3.2.a. Selection of supported entrepreneurs

The papers dealing with the selection of supported entrepreneurs look (1) at the number of participants who can benefit from training and learning initiatives, and (2) the criteria to select participants. Often, these two issues are linked to the objectives and the temporal structure of the program.

On the one hand, in pre-incubation programs, there may be flexible approaches to participant selection and placement, as in the case illustrated by Secundo et al. (2020), where the program admits groups of about five up to a maximum of fourteen groups per year.

However, in incubators, selection in the program may have a fixed approach (Fong, 2020). It usually involves formal admission interviews along with a motivational questionnaire to measure the participant's level of commitment and identify what they expect from participating in the course (Assenova, 2020).

Finally, selection into accelerators can involve procedures with (a) a formal process involving deliberative scoring sheets, and (b) or ad-hoc process of evaluation – involving managing directors and external evaluators. For example, in the case of (Mansoori et al., 2019), where the course admits a maximum of 20 entrepreneurial teams per cohort, and each team must consist of at least two entrepreneurs.

2.3.2.b. Methodologies and target groups

It is interesting to note that the move towards an emphasis on ESOs as a provider of education and training is a recent evolution. According to our review, the type of entrepreneurship education and training programs that ESOs offer to their participants can have a practical, theoretical, or mixed-method approach. In addition, depending on the methodology used in the programs, learning will be individual or rather take place in a team (Figure 2.4).

– – Insert Figure 2.4 about here – –

Looking at training and education methodologies with a practical approach the pre-incubation of new entrepreneurial ideas begins with the elaboration of a business plan to verify the feasibility of the project, test the market need, acquire market credibility (Bezerra et al., 2017) and spread the entrepreneurial mindset among participants (Secundo et al., 2020). Other forms of practical learning environments (McGee et al., 2021) where individuals learn, also

together with their team and peers, are co-working spaces (Jones et al., 2021), networking events (McGee et al., 2021), demo days (Haneberg & Aadland, 2020), mentoring and coaching schemes (Wolf, 2017; Piqué et al., 2020). Also, banks, venture capitalists, and business angels are involved in this process to help aspiring entrepreneurs analyze the feasibility of the business project and develop the first business plan, along with research centers and university laboratories (Wolf, 2017). Some pre-incubation programs prefer to use a theory-based approach to help individuals develop their entrepreneurial ideas - instead of a more practical, learning-by-doing approach - as in the case of cohorts of students exposed to courses on venture creation and business performance (e.g., Zhao et al., 2022).

Pre-incubation programs that have a strong theoretical component tend to divide the training period into several phases, including a preparatory period that can last from six months to a year (Williams Middleton & Donnellon, 2014). During this period, teams participate in workshops, seminars with role models (Blank, 2021), or specific lectures on business opportunity recognition, marketing, fiscal management, and legal aspects (Boukamcha, 2015; Zheng et al., 2017). While we made a typology-like distinction between practical and theoretical approaches, several pre-incubation programs use a mixed approach (Kolade, 2018), by combining theory with practice while offering seminars, case studies, project-based activities, mentoring, and consultancy services (Secundo et al., 2020). Some of these are organized around a business plan competition in which there is a strong interaction between entrepreneurial team members and stakeholders (e.g., venture capitalists, business angels, and potential partners). Here, entrepreneurial teams are asked to provide a business plan and discuss it in pitching sessions in front of mentors and external experts (Secundo et al., 2020), who provide advice and guidance. From this learning-by-doing process, individuals and entrepreneurial teams can learn by drawing inspiration from the support they receive.

As participants advance in incubators, their learning occurs through collaborative industry projects (Fong, 2020). For instance, the review paper by Jones et al. (2021) provides an overview of how the business incubator concept has evolved over the years: the first generation includes shared spaces, the second includes business advice and networking and the third introduces mentoring and coaching support. A sizable portion of the literature reviewed focuses on advanced mentoring strategies, emphasizing key aspects of the mentor-mentee relationship, such as the quality of the mentor assigned (Assenova, 2020) and the level of commitment and support provided by mentors to entrepreneurial teams (Nicholls-Nixon &

Maxheimer, 2022). In terms of the content of incubator training offerings, training typically focuses on areas such as identifying business opportunities, marketing strategies, and articulating a vision. In addition, practical assistance is provided to entrepreneurs in developing profit plans, establishing fiscal management, and financing channels (Zheng et al., 2017). So, incubators provide an environment rich in learning opportunities and support for fostering entrepreneurship. Through advanced mentoring strategies and hands-on training, incubators play a crucial role in preparing startups to meet market challenges and realize their entrepreneurial potential.

In accelerators, hands-on activities offer a wide range of opportunities for developing entrepreneurs and their businesses. In addition to meetings with investors (Cubukcu & Gulsecen, 2020) and demonstration days (Hagebakken et al., 2021), which provide a valuable showcase for presenting one's projects and attracting potential funders, other elements are critical to the success of start-ups. Mentoring provided by industry experts offers valuable support, guiding entrepreneurs through the specific challenges of their field and offering practical advice based on experience (Cohen et al., 2019). One of the widely used methodologies in this contest is the lean approach, in which entrepreneurs learn through experimentation. The lean method assumes that entrepreneurs formulate testable hypotheses of their business ideas, test them on the market with a Minimum Viable Product (MVP), and replace the invalidated hypotheses with new and re-tested ones (Mansoori et al., 2019). Miles et al. (2017) provided evidence that participation in an acceleration program provides a form of authentic learning (Herrington & Oliver, 2000). This approach includes specific elements such as the realism of the learning environment and activities (e.g., tasks that require the application of learned skills, such as pitching), role modeling, and authentic assessment (e.g., conducted by coaches). Additionally, interviews with potential customers and face-to-face meetings with industry experts enable entrepreneurs to better understand market needs and adapt their solutions based on the feedback they receive (Cohen et al., 2019). In addition to these direct interactions, private sessions with program directors and regular meetings with other participating businesses in the same cohort foster the exchange of knowledge and experience. These moments provide a supportive and collaborative environment in which entrepreneurs can engage with each other, share their challenges, and find innovative solutions together. Discussions with seminar speakers further enrich entrepreneurs' knowledge base, providing them with insights and ideas to apply in their business growth journey (Hallen et al., 2020).

Taken together, these activities not only contribute to the individual development of start-ups but also to the creation of networking and collaboration opportunities that can be critical to the long-term success of the businesses involved. Sharing resources, building relationships, and exchanging ideas in a mutually supportive learning environment are key elements that characterize the accelerator experience and can have a significant impact on each participant's entrepreneurial journey.

2.3.2.c. Temporal development of the program

The literature shows that the length of different entrepreneurial support programs is variable, and often intricately linked to the start-up life cycle (Fairlie et al., 2015). Literature reports that, on average, incubation periods for start-ups in the pre-venture and infancy stages last between 1 and 5 years; while acceleration periods for start-ups in the infancy and early growth stages are 3 months (Cohen, 2013). However, we know that the support period may vary from case to case. Indeed, while there are pre-incubation programs and incubators with a minimum duration of one year, there are just as many with a much shorter duration.

For instance, in the study by Boukamcha (2015) conducted in Germany, the CEFE incubator program was created to stimulate the entrepreneurial intentions of participants in the short term, especially focusing on the desirability, through an incubation period of only 20 days (about 3 weeks). Another example is the study of Blank (2021) regarding the pre-incubation program 'i-lab', which is launched every semester and lasts twelve weeks. In addition, programs might be designed to be "concentrated" in time, or "diluted" over time, which is another factor that can influence the outcomes of incubated startups and individuals (Fairlie et al., 2015). In the study by McGee et al. (2021), the Music Den pre-incubation program, lasting from four months to a maximum of one year, allowed individuals who joined the program to be paired with partner companies and travel abroad to attend conferences, develop useful career partnerships and increasing their networks. As an example of a more "diluted" program, the Secundo et al. (2020) Contamination Lab program is divided into two phases of three months which allows the entrepreneurial teams working on the market launch of their product/service, on the legal status of their company and, in some cases, on patent applications. The length of time spent in receiving entrepreneurial training and education, such as benefitting from a coach guiding the entrepreneur in the creation of the business, team, and vicarious learning, seems to

be beneficial for potential entrepreneurs in terms of increased self-efficacy, especially within incubators (Ikebuaku & Dinbabo, 2018) and accelerators (Mansoori et al., 2019).

2.3.2.d. Assessment of entrepreneurial learning[2]

Studying the assessment of participants throughout programs means understanding what kind of outcomes and impact we intend to measure. This includes two main aspects: (1) participant-level evaluation, which examines the alignment between goals, content, and learning outcomes for individual or group participants; and (2) program-level impact in terms of entrepreneur generation and relationships with local/regional stakeholders (Hagebakken et al., 2021).

Regarding participant-level assessment, particularly with adult or young adult learners who show a stronger response to active learning approaches, ESOs are advised to integrate formative and reflective assessment methods. McGee et al. (2021) argue that participants should engage in self-assessment exercises, assessing their developmental potential, growth strategies, strengths and weaknesses, and problem-solving skills. In addition, an emerging principle in individual-level assessment is authentic assessment. For example, in pre-incubation or accelerator programs, realistic informal and formal assessments of participants' learning are conducted throughout the program (e.g., periodic review panels, Patton & Marlow, 2011) or at its end, as in pitches or presentations at Demo-Days to solicit equity investments (Miles et al., 2017). Assessment can therefore take place through a mixed approach with demonstrations of theoretical knowledge acquisition (e.g., written tests, and oral examinations) alongside practical demonstrations of skills (Kolade, 2018).

Shifting the focus to program-level evaluation, ESOs develop tools to monitor the relevance of their programs. This includes assessing the relevance of programs in terms of alignment with the priorities and policies of the target group, recipients, and donors. In addition, effectiveness is assessed by the extent to which the intervention achieves its objectives. Impact evaluation measures the transformative effect of the intervention, while sustainability evaluation measures the likelihood that the net benefits of the intervention will persist into the future (Hagebakken et al., 2021).

[2] This category of studies focuses exclusively on pre-incubation and accelerator programs, as none of the studies analyzed involved incubators.

Because many entrepreneurial education and training activities within ESOs involve collaboration with external partners such as mentors, coaches, experts, and consultants, evaluating their performance becomes critical to assessing the overall effectiveness of the program (Ting et al., 2017; Nicholls-Nixon & Maxheimer, 2022) and its refinement.

2.3.3. Outcomes of Entrepreneurial Support Organizations

Our review has shown that available research has stressed the importance of the consequences of entrepreneurship education and training in ESOs, at a different level of analysis. In the following, the outcomes of entrepreneurship education and training programs are discussed at the (1) individual, and (2) organizational levels of analysis.

2.3.3.a. Individual level

Participation in entrepreneurship education and training within pre-incubation programs produces many outcomes at the individual analysis level. First, individuals acquire technical skills relevant to their entrepreneurial ventures. Second, there is a significant improvement in soft skills, entrepreneurial awareness, mindset, and decision-making skills (Kolade, 2018). For example, Stephens et al. (2021) use the theory of socially situated cognition to suggest that entrepreneurship education and training, facilitated by pre-incubation programs through networking opportunities, university affiliations, sponsorships, and professional services, have a positive impact on students' entrepreneurial decision making. This is attributed to influencing their entrepreneurial frameworks, cognitive patterns, and academic perspectives, enriching them with increased knowledge and resources. Such pre-incubation experiences instill an entrepreneurial mindset in recent graduates (Jones et al., 2021). Another individual-level outcome, which represents a hotly debated topic in the pre-incubation literature, is the impact of the training and education initiatives on the cognitive variables that drive intentions to pursue a career in entrepreneurship (Bacq et al., 2017; Passaro et al., 2017; Guerrero et al., 2018). These studies, relying on cognitive theories such as the Theory of Planned Behavior (Ajzen, 1991) and Social Cognitive Theory (Bandura, 1986), show that participation in training courses by pre-incubation programs changes the entrepreneurial intentions, perceived desirability, and feasibility of incubates.

In the context of incubators, individual-level outcomes are many and impactful, encompassing various aspects of innovation and entrepreneurship. Zheng et al. (2017) research

underscores the significant role of incubators in equipping nascent entrepreneurs with the expertise essential for entrepreneurial success, thereby strengthening their resilience and self-efficacy. In addition, incubators serve as catalysts for the advancement of disadvantaged entrepreneurs by facilitating the acquisition of new knowledge, fostering revenue growth, stimulating employment expansion, and improving overall profitability (Assenova, 2020).

Empirical evidence suggests that entrepreneurs matched with competent mentors show more significant assimilation of new knowledge during the incubation period and, subsequently, substantial improvement in business performance after incubation. Mentoring proves more beneficial for entrepreneurs with limited knowledge and experience before the incubation period, effectively filling gaps in formal education and professional background (Ikebuaku & Dinbabo, 2018). Interestingly, the benefits of incubators extend to different demographic groups, with young entrepreneurs aged 18-24 and 30-35 reaping the most significant benefits, along with ethnic minority entrepreneurs (Li et al., 2020; (Antonovica et al., 2023). Notably, benefits remain consistent across genders, indicating equal opportunities for male and female entrepreneurs to take advantage of the resources and support offered by incubators. In addition, incubators serve as foci for technological entrepreneurship, igniting innovation and inspiring applicants to develop new business plans, improve existing capabilities, and address specific business challenges (Tang et al., 2023; Yasin & Majid Gilani, 2023). To foster entrepreneurial skills and mindsets, incubation programs cultivate digital communication skills, social media expertise, networks, industry engagement, research skills, innovative thinking, and strategic planning (Tang et al., 2023; Yasin & Majid Gilani, 2023). However, it is essential to recognize that alongside these transformative outcomes, instances of overconfidence can also occur, underscoring the nuanced interaction between incubation experiences and entrepreneurial development (Tang et al., 2023).

In the context of accelerators, the dynamics of knowledge transfer and networking among female entrepreneurs, as highlighted by Kwapisz's (2022) findings, reveal interesting insights at the individual level of analysis. Women entrepreneurs valued the benefits of knowledge transfer (such as business skills development) significantly higher than their male counterparts. In contrast, networking, in formal and informal settings, is rated significantly lower by female entrepreneurs than their male counterparts. This discrepancy may reflect different preferences or perceptions regarding the usefulness - by gender diversity – of networking activities in promoting entrepreneurial success. Participation in accelerators offers

several benefits, also in terms of the ability to attract funding (Miller et al., 2024). Research by Kapinga et al. (2018) and Clayton (2024) highlights how participation in these programs helps founders attract investments from both venture capitalists and the federal government. In addition, startups that go through accelerators are more likely to receive equity funding (Dams et al., 2022; Chowdhury & Audretsch, 2024). Female founders participating in accelerator programs experience a significant increase in the likelihood of obtaining equity financing (Clayton, 2024). This increase exceeds that observed among their male counterparts (Dams et al., 2022). Taken together, these observations underscore the nuanced interaction between gender dynamics and the perceived value of various resources and support mechanisms within the entrepreneurial ecosystem.

2.3.3.b. Organizational level

The studies in this group (surprisingly) do not focus on outcomes related to new firm creation. Instead, the literature reviewed focuses on the benefits of training and learning initiatives for the ESOs themselves.

By assessing the outcomes of individual learning, and by receiving feedback from the participants, managers of pre-incubation programs and accelerators can engage in program re-design and program growth (Mansoori et al., 2019; Secundo et al., 2020; Nicholls-Nixon & Maxheimer 2022). For example, an important set of program revisions regard the creation of tailored support activities (e.g., mentoring services) considering the unique needs of groups (Ting et al., 2017), especially minorities (Nicholls-Nixon & Maxheimer, 2022).

Other forms of program re-design concern the inclusion of innovative and dynamic methodological approaches to promote experiential learning among participants (Mayorga, 2019). In other studies, (Cubukcu & Gülseçen, 2020; Blank, 2021) the discussion focuses on the role of ESOs' staff, which should invest in customizing the resources offered to incubated start-ups through differentiation of programs. To achieve this Redondo & Camarero (2017) and Yusubova et al. (2019) suggest that managers and directors of pre-incubation programs and incubators should recruit staff members with the skills and competencies that should match the specific needs of the incubated. Moreover, pre-incubation programs' managers should implement indicators and tools for the constant evaluation of the incubates achievements, for example, trying to measure the effectiveness of mentors through periodic assessments (Patton & Marlow, 2011; Nicholls-Nixon & Maxheimer, 2022).

2.4. Discussion

Based on the evidence collected and presented, we develop a taxonomy of educational ideotypes for ESOs. We believe this taxonomy can help in orienting individuals wanting to take part in entrepreneurial dynamics and looking for the right way to start. At the same time, our ideotypes taxonomy provides a guide for ESOs for a better positioning.

A general reflection on the antecedents is that we see institutional support and intervention as relevant for pre-incubation, incubation, and acceleration programs, with no major distinction. Institutional effort is key to bridging ESOs with other initiatives of entrepreneurship education, experiential knowledge, and regional development. One consistent finding common to several papers is that the role of institutions should help ESOs to develop tailored education and entrepreneurial support in consideration of the specificities of the local context (in consideration of local development, of industrial specificities, of the availability of rural areas, etc.). Institutional intervention can thus contribute to making ESOs more effective in less developed contexts and rural areas, favoring networks among entrepreneurial ecosystem actors, and local economic development, thus influencing the variety of entrepreneurship education and training programs.

As for the variety of entrepreneurship education and training in ESOs, we see that pre-incubation programs are characterized by higher flexibility and informality in the selection process. As for the methodological approach, pre-incubation programs tend to use more theoretical approaches, accelerators bring in hands-on and prior experience from industry, while incubators go for a mixed approach. Incubators and accelerators tend to adopt fixed/standard approaches and have more rigid procedures. In terms of assessment of learning from our analysis, we do not see relevant differences among several types of ESOs. Assessment can therefore take place through a mixed approach with demonstrations of theoretical knowledge acquisition (e.g., written tests, and oral examinations) alongside practical demonstrations of skills.

Finally, as concern the outcomes, pre-incubation programs work in support of general improvement in soft skills, entrepreneurial awareness, mindset, and decision-making; incubators are better focused on the mentorship program and digital communication skills, whereas accelerators see an important outcome in fostering relational abilities and networking.

Bringing together these insights from our analysis and focusing on the differences among the ESOs, we suggest three educational ideotypes below.

2.4.1. Educational Ideotypes

(Pre-incubators) Socializing entrepreneurship

This ideotype encompasses entities/organizations working to raise awareness and consensus on entrepreneurial opportunities. It builds on the foundation of entrepreneurship by providing initial training in basic business concepts, entrepreneurial skills development, and networking. It is suitable for those who are new to entrepreneurship and looking for 'foundation' knowledge on new venture creation, on how to build a team, aimed at successfully starting a new business.

Pre-incubators adopt a more theoretical, preparatory, flexible, and adaptable approach, offering transversal programs to educate people from different backgrounds and with prior expertise in diverse fields. Their target is represented by people who might not have (yet) an entrepreneurial idea but are somehow interested in knowing more about entrepreneurship and/or understanding if their ideas (when available) are viable and are of potential interest to the market. The aim is to work on an entrepreneurial mindset and raise awareness. Pre-incubators can treat a vast number of individuals and, as such, their educational approach is driven by the goal of 'socializing entrepreneurship.'

(Incubator) Planning entrepreneurship

This ideotype refers to entities/organizations targeting individuals with an entrepreneurial idea, teams of individuals and/or founders of already established start-ups. Their educational approach is driven by the goal of 'making things happen and be concrete' and as such, they plan for entrepreneurship to be in place. Therefore, training is based on all aspects of starting and running a business, including legal services, technical support, financial mentoring, and entrepreneurial skills development. Training can follow a more traditional approach to entrepreneurship, including industry analysis, market assessment, business model testing, and developing financial projections.

It is suitable for entrepreneurs seeking comprehensive, long-term support for their entrepreneurial journey. Organizations within this ideotype tend to be more selective than pre-incubators, to deliver better value in vertical domains, based on matching participants' needs

with their specific offer, which can take place in a limited number of industries/fields. The end goal of their educational approach is helping individuals/teams/founders to generate/fine-tune a viable and proper business plan.

(Accelerator) Boosting entrepreneurship

This ideotype often includes entities/organizations of specialists and experts, within specific vertical domains, targeting established start-ups and/or advanced entrepreneurial projects, offering them opportunities to scale quickly and/or to go international. The educational approach is meant to expose the target to additional opportunities and/or fine-tune a specific aspect of the business model. Therefore, it builds on intensive technical mentoring, coaching, and hands-on training, often with industry experts. It is designed for entrepreneurs with a strong bias for action and an urgent need to bring their product or service to market quickly. Within this ideotype, learning takes place through relations with the outside. Open innovation strategies are taught and practised, to attract the interest of potential investors and/or corporates. Entities in this category tend to have similar approaches, somehow fixed length of program, rigid procedures, and tough selection. The most important goal is to create the right networks to make entrepreneurial ventures visible to external investors and potential stakeholders.

2.5. Conclusions and future research avenues

2.5.1. Theoretical contributions

The provision of entrepreneurship education and training by ESOs is an emerging phenomenon, that is gaining attention in the academic literature as the antecedents and variety of such initiatives might determine the extent to which they are effective in supporting nascent ventures (Rideout & Gray, 2013). Through a rigorous and replicable methodology and literature analysis (Kraus et al., 2020), this review of the literature sought to bring together the factors that motivate and influence the variety of entrepreneurship teaching and learning initiatives in ESOs, together with its outcomes. We hold that these organizations, given their mission, are faced with the necessity to provide experiential, hands-on programs focused on students' needs and interests, contact with external experts, and networking in business and industry environments.

With this work, we contribute to two streams of research.

First, we contribute to the literature on entrepreneurial ecosystems (Stam & Van De Ven, 2021) by shedding light on the distinct roles that ESOs can have in nurturing local contact in different stages of entrepreneurial journeys, from the initial raising awareness and mindset generation to supporting scale-up and growth. Oftentimes entrepreneurial ecosystems appear crowded with entities and organizations that might create redundancy and questions and doubts arise about their role. Here we show that potentially there is room for different actors, to the extent that it is clear their positioning. They can serve different targets and they could create synergies among them from a value chain perspective.

The advice that we give to individuals/managers running ESOs is to identify their correct positioning and communicate clearly what makes them different from others, how they create synergies and at which stage of the value chain. This would help in communicating the existence of a coordinated ecosystem working to deliver value.

Second, we contribute to the literature on entrepreneurial education (Pittaway & Cope, 2007). Entrepreneurial education has been addressed in the literature on entrepreneurial universities (Davey et al., 2016) and academic engagement (Perkmann et al., 2021). With the ideotype we propose, we are shedding light on educational approaches/methods and pedagogies that can be used to educate in entrepreneurship. Such variety reflects the complexity/articulation of entrepreneurial processes, which build on heterogeneity and variety and generate different learning/education needs at various stages of the process. We also observe a variety of potential applicants (young, mature, and adults), with different backgrounds and mindsets. Entrepreneurial education can address all of them through a variety of programs, based on different pedagogic approaches. Previous works addressed differences in training programs for entrepreneurship in terms of education: about entrepreneurship, for entrepreneurship and through entrepreneurship (Pittaway & Cope, 2007; Pittaway et al., 2009). Our ideotype taxonomy contributes to this stream of work. On the one hand, it confirms the importance of 'early stage' training programs, like pre-incubators (aiming at raising awareness 'about' entrepreneurship at large), of more advanced incubator training programs (aiming at supporting the development of business plans 'for' entrepreneurship) and of more sophisticated or late-stage accelerator programs (aiming at navigating 'through' entrepreneurship).

Finally, our study showed which organizational and contextual aspects drive the emergence of training and education initiatives by ESOs, and the possible relationships in terms of economic development and growth.

These theoretical contributions represent a platform for two sets of practical implications. One is for the managers of ESOs, helping them reflect on the factors that might (directly or not) influence how they decide to design effective entrepreneurship education practices for adult learners, and what can be the outcomes of such decisions. The other set of implications is for policy makers, as this work highlights the need to become aware of the variety of factors influencing the outcomes of entrepreneurship education and training interventions by ESOs, and the need to support the development of adequate pedagogical approaches and competencies in the design, monitoring, and assessment of these initiatives.

2.5.2 Future research avenues

An important finding provided by this literature review is the display of the heterogeneity of entrepreneurial education and training programs carried out by ESOs. This is relevant to guide future studies willing to assess and measure the impact of ESOs on participants' competencies or business/entrepreneurial endeavours. The variety of selection processes, educational and training methodologies and target groups, temporal development, and assessment methods and tools, suggest that many intervening variables can influence the outcomes and processes of such education and training initiatives.

In the future, scholars should therefore study the success of entrepreneurial support programs with care, avoiding, for instance, simple dichotomous measures of participation in such programs (e.g., Lukeš et al., 2019; Sansone et al., 2020) to determine the benefits of supported entrepreneurs and firms, and adopt robust statistical techniques to approach causality and explanatory mechanisms in such settings, such as experiments (e.g, Camuffo et al., 2020). In addition, qualitative accounts of how learning takes place during entrepreneurship education and training courses represent a promising emerging theme (Mansoori et al., 2019). On this topic, Patton & Marlow (2011) suggest a critical analysis of whether the support measures provided to ensure learning are used by the founder and the entire entrepreneurial team. Future research should focus on a longitudinal process-oriented approach (Wright et al., 2017) to follow individuals throughout their journey. For instance, if the training program is supposed to lead to the creation of new companies, researchers should follow them from the moment they apply for the program, to when they are exposed to the training, to follow them from having the intention of doing business, to when the intention turns into a behavior. By having a complete overview of the whole process and the mechanisms behind the various paths to

business creation, we will be able to understand the types of activities that succeed and those that fail. If the objectives of the program are to sustain the creation of entrepreneurial competencies, individuals should be tracked over time to understand when and how the knowledge and practical insights gained during the training programs were used in their professional or personal lives.

A future line of research could focus on additional "antecedent factors" also at the individual level, by analyzing the role of (aspiring) entrepreneurs in being aware of such programs and being able to select them depending on their goals and their resources (e.g., networks, information, time). Individual-level dynamics might influence the role of ESOs and contribute, with their needs and expectations, to the evolution of educational ideotypes.

Finally, a third group of insights provided by this work regards the possibility for ESOs to reflect on their own entrepreneurship education and training initiatives in light of the individual outcomes – achieved by implementing a variety of methodological approaches – and revising these initiatives. Only a handful of studies have reflected on how entrepreneurial education and training by ESOs should be more context-sensitive, for instance by responding to the needs of participants in rural contexts (e.g., Hagebakken et al., 2021) or in developing countries (Kapinga et al., 2018). In addition, few studies have tapped into the issue of equitable access to entrepreneurship training and education by ESOs, as well as equitable and inclusive participation in the design and delivery of these programs (e.g., Kapinga et al., 2018). We strongly encourage future studies to question the issue of diversity, equity, and inclusion in such programs, looking both at participants and at ESOs' practices and structures.

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2.7. Figures

Figure 2. 1 - Three-stage process of the data collection.

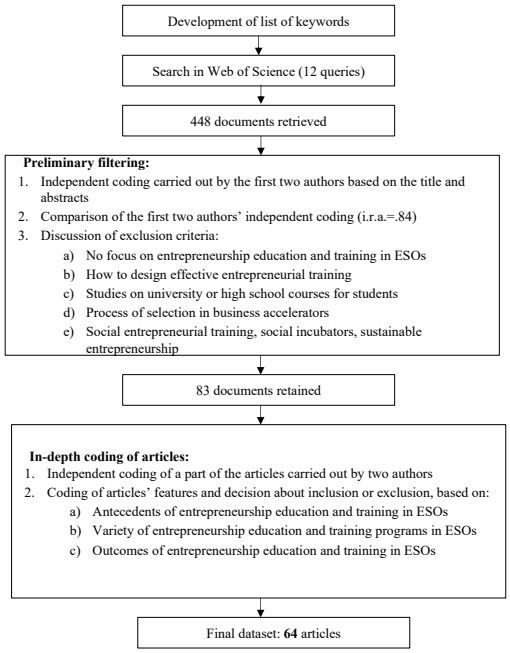


Figure 2. 2 - Publication year of the articles included in the sample.

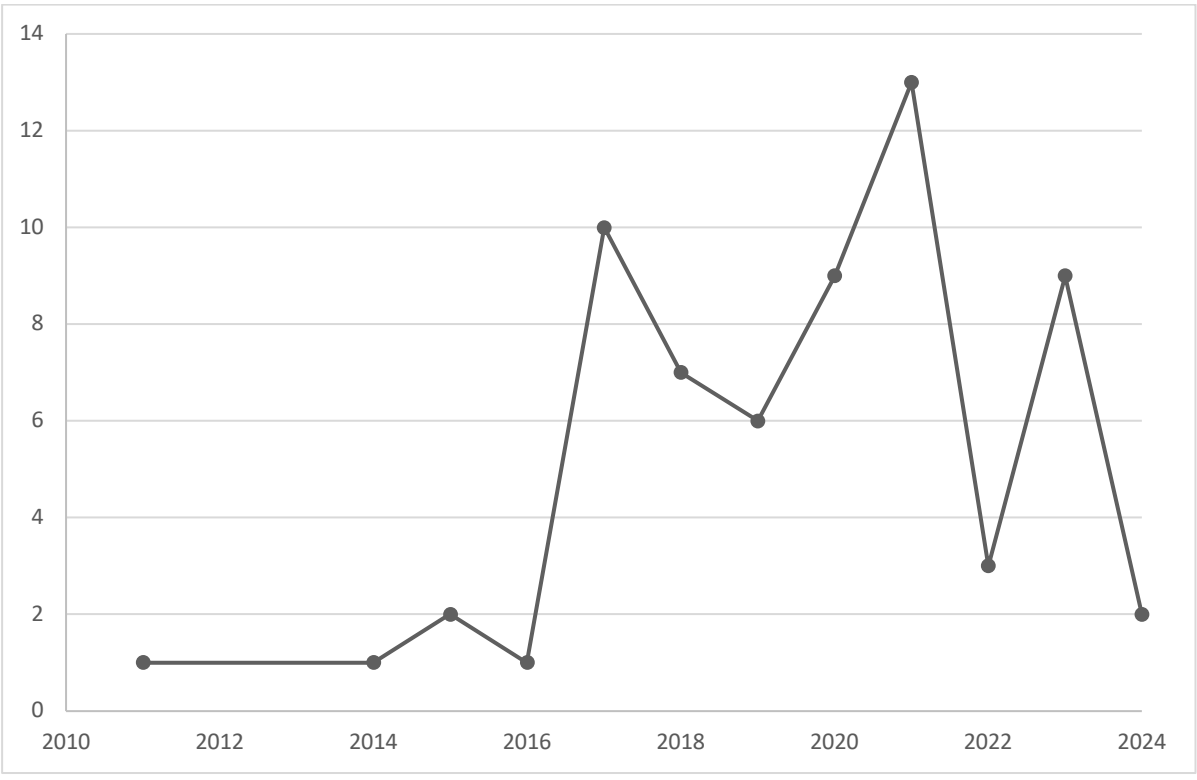


Figure 2. 3 - Entrepreneurship Education and Training (EET) in ESOs: antecedents, variety, and outcomes.

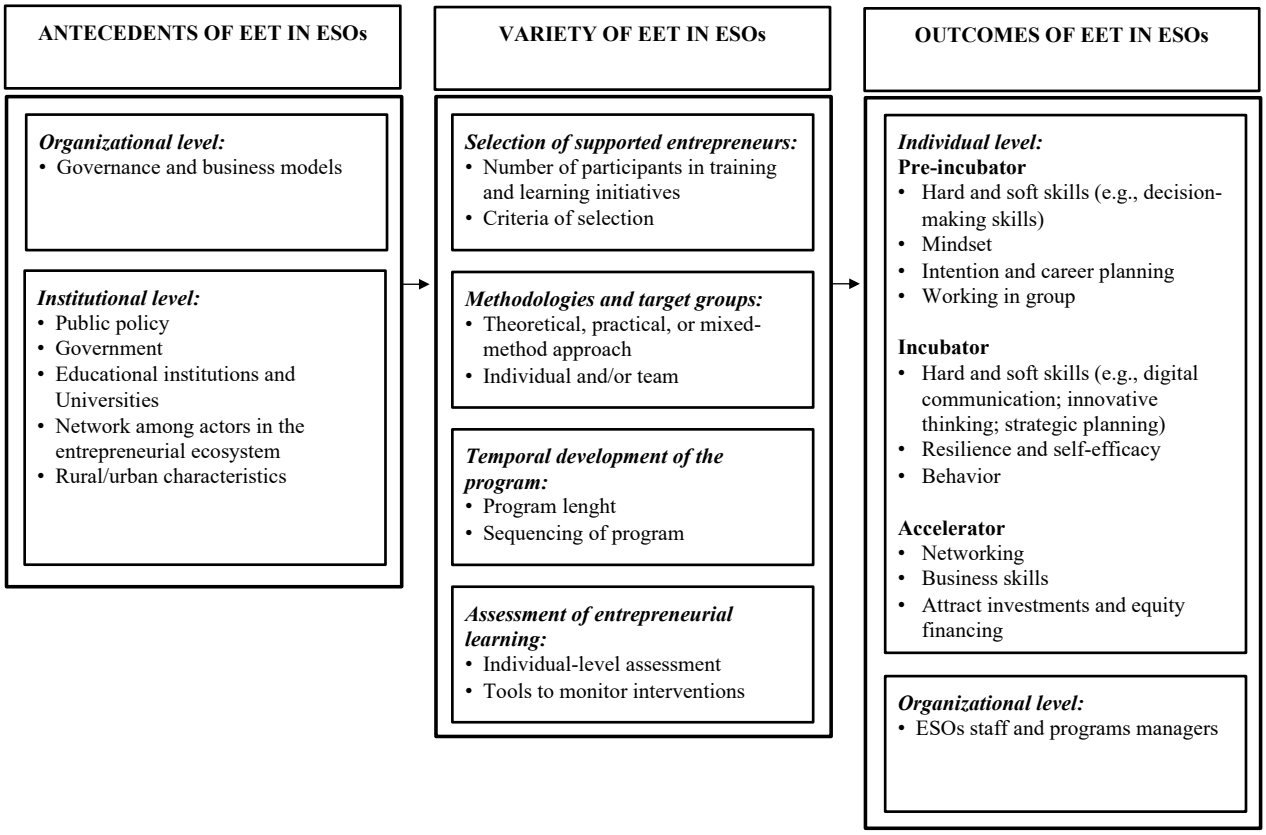
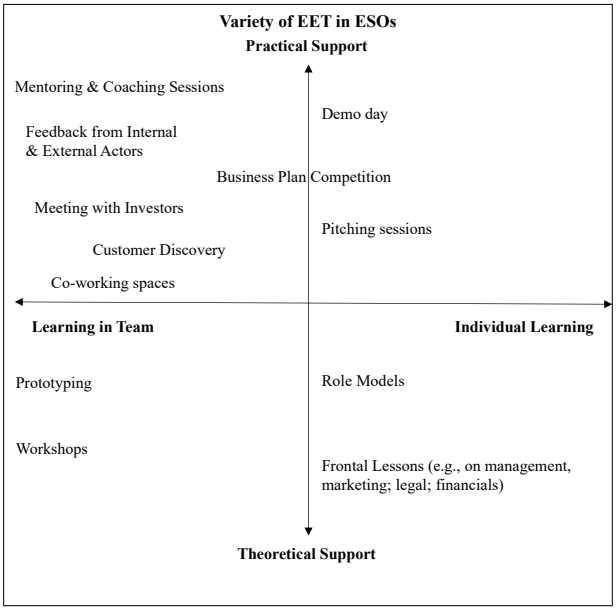


Figure 2. 4 - Variety of Entrepreneurship Education and Training (EET) in ESOs.



2.8. Tables

Table 2. 1 - Top 10 journals in terms of the number of publications from the sample.

Journals	**Nº of Articles**
The Journal of Technology Transfer	6
Industry and Higher Education	4
Education and Training	3
Organization Science	3
Regional Studies	2
Entrepreneurship Research Journal	2
Journal of Small Business and Enterprise Development	2
International Journal of Innovation and Technology Management	2
International Journal of Entrepreneurial Behavior & Research	2
Sustainability	2

Table 2. 2 - Characteristics of sampled articles.

Conceptual Articles (N = 5)			
Theoretical	3 of 5 (60%)		
Review	2 of 5 (40%)		
Empirical Articles (N = 59)		Data Source	Count (%)
Qualitative	24 of 59 (41%)	Primary	34 of 59 (58%)
Multi-Case Study	9 of 24 (38%)	Secondary	6 of 59 (10%)
Case Study	12 of 24 (50%)	Both	19 of 59 (32%)
Ethnography	3 of 24 (12%)	Interview	33 of 59 (56%)
Quantitative	23 of 59 (39%)	Survey	24 of 59 (41%)
Regression	21 of 23 (91%)	Archival	15 of 59 (25%)
Other	2 of 23 (9%)	Observation	13 of 59 (22%)
Mixed Methods	12 of 59 (20%)	Database	2 of 59 (3%)

3. RESEARCH CONTEXT

Start Cup Emilia-Romagna: Stylized Facts, Prospects and Impact[1][2]

3.1. Introduction

Over the past decade, pre-incubation programs designed to cultivate business ideas at an early stage of development have garnered increasing attention. These programs aim to promote business opportunity recognition and the establishment of new ventures (Bergman et al., 2022; Jones and Pittaway, 2014; Stam and Spiegel, 2018). Among the support programs that are attracting increasing international attention are the Business Plan Competitions. These competitions, structured as contests among teams of (aspiring) entrepreneurs, are strategically structured to foster the acquisition of entrepreneurial skills through the systematic exchange of information and knowledge. This exchange occurs both within the entrepreneurial teams and with external stakeholders (Secundo et al., 2023). These competitions are typically promoted by regional entities in collaboration with private organizations, with a specific focus on nurturing the establishment and growth of companies characterized by high technological content (Breznitz and Zhang, 2022). Described as a *"learning environment",* Business Plan Competitions provide individuals with opportunities to expand their knowledge and enhance their personal development (Jones, 2010).

Globally, the best practices[3] of entrepreneurial support programs include access to coworking spaces (Jones et al., 2021), participation in collaborative projects with businesses (Fong, 2020), and networking events with investors (Cubukcu and Gülseçen, 2020). In Europe, some of the best practices[4] concern entrepreneurial education (Williams & Donnellon, 2014), with the participation of teams in workshops and seminars with serial entrepreneurs (Blank, 2021), demonstration days (Hagebakken et al., 2021), and seminars on business opportunities, marketing, financial management and legal aspects (Boukamcha, 2015). It is also essential to highlight the mentorship and consultancy services (Secundo et al., 2023) provided by venture

[1] This study is part of a policy report, coauthored with Riccardo Fini, Rosa Grimaldi, and Daniela Bolzani.

[2] The full version is available here: https://ssrn.com/abstract=4629753

[3] For example, we highlight the Design Incubation program Program (DIP) at the Hong Kong Design Centre.

[4] CLab program of the University of Salento and the CLab of the Polytechnic of Turin and the University of Turin.

capitalists, business angels, and experts in the sector who, following the presentation of the idea - in the form of a pitch deck - provide advice and guidance to define and improve the business idea (Patton & Marlow, 2011).

In Italy, the phenomenon of Business Plan Competitions is growing rapidly: over the last twenty years, 77 Business Plan Competitions have been activated (Passaro et al., 2017). Among these, the most important and iconic is the Start Cup[5], which is a systematization and aggregation of the 15 Business Plan Competitions that join the Premio Nazionale per l'Innovazione[6] (PNI). Consistent with what happens in other European and global contexts, including Italy, the Business Plan Competitions aim to encourage the birth of new technological and innovative businesses, encouraging research, rewarding the best innovative start-up/spin-off projects coming from the regional scientific research system, and supporting the economic development of regional territories. In this context, the Emilia-Romagna region has been committed to creating the conditions to encourage the birth and growth of highly innovative businesses for more than twenty years (Fini et al., 2008). It is thanks to the support of administrators and policymakers, industrial excellence, and the ability of universities to graduate talent (Fini et al., 2016; Chiarello et al., 2019) and trigger innovation (Bolzani et al., 2014).

This chapter aims to illustrate part of the sample (i.e., 2017 – 2018 – 2019 editions) and the research context in which the dissertation has been developed, named "Start Cup Emilia-Romagna". The Start Cup Emilia-Romagna is a Business Plan Competition[7] organized by ART-ER[8], affiliated to the PNI, with the involvement of various private partners. The initiative is financed by the "European Social Fund", while private sponsorships support the prizes. The pre-incubation program lasts six months (from May to October each year). During this period, the Start Cup Emilia-Romagna offers support through entrepreneurship training courses, one-to-one meetings with mentors, and meeting days with potential customers and other local partners. Despite the great attention and interest received from political decision-makers and aspiring entrepreneurs, there are no studies that analyze the effectiveness of this type of initiative using longitudinal, multi-level data from multiple sources.

[5] https://www.pnicube.it/startcup

[6] PNI – Premio Nazionale per l'Innovazione is the most important Business Plan Competition in Italy, in which the innovative projects that have passed the selection of the Start Cup (i.e., regional business plan competitions linked to Italian Universities and associated public research bodies).

[7] https://www.emiliaromagnastartup.it/it/innovative/soggetto/start-cup-emilia-romagna

[8] https://www.art-er.it/

The use of the Start Cup Emilia-Romagna research context is important for several reasons. First, the Start Cup Emilia-Romagna context provides a unique opportunity to contribute to the existing literature on the effectiveness of pre-incubation. Providing an in-depth, longitudinal analysis of this initiative can enrich academic understanding of best practices in pre-incubation of startups and regional economic development policies.

Second, understanding the effectiveness of Start Cup Emilia-Romagna can have important practical implications for economic development agencies, policymakers, and entrepreneurs themselves. Research findings could be useful in improving pre-incubation programs and their ability to support the launch and growth of new businesses.

Third, longitudinal, multilevel research on Start Cup Emilia-Romagna would allow for an assessment of the long-term impact of this initiative on the local entrepreneurial ecosystem. This is critical for measuring the return on investment of public and private funding to support these initiatives.

Fourth, analysis of the data collected by Start Cup Emilia-Romagna provides an opportunity to better understand entrepreneurial dynamics, including the factors that influence the success of startups, the challenges encountered during the startup process and the strategies adopted to overcome them.

Fifth, insights derived from the research can be used to inform the design and implementation of future pre-incubation programs. By identifying areas where Start Cup Emilia-Romagna has been successful and those where it could improve, recommendations can be made to optimize the effectiveness of similar pre-incubation programs in other regions.

Therefore, by using secondary data relating to the 249 individuals (i.e., candidates) of the 2017, 2018, and 2019 editions, we offer an overview of the Start Cup Emilia-Romagna program. Among the 249 candidates, 100 were accepted into the program (i.e., accepted), while the 149 were rejected (i.e., rejected). All candidates were observed longitudinally until 2022, documenting their involvement in entrepreneurial activities. The candidates were, on average, 38 years old. In 77% of cases, they were men, and 60% had a university degree, which in 90% of cases was obtained in universities located in the North of Italy. These characteristics are particularly accentuated among those who were accepted into the program, with 75% of the

participants having a university degree, in 70% of cases in STEMM[9] disciplines. The analysis also shows that 99 individuals - of which 43 were accepted and 56 were rejected from the program - are founders of 131 firms.

The remainder of the chapter is structured as follows. First, we introduce the Start Cup program, followed by the methodology and characterization of the sample, comparing candidates across editions. Subsequently, for each edition, we describe in the aggregate form the characteristics of the candidates, accepted, and rejected, analyzing any similarities and/or differences between the groups. Moreover, we analyze the differences between (i) the individuals who were accepted or rejected from the program and who started a firm and between (ii) the founders and individuals accepted and rejected from the program who have not established a firm. The chapter concludes with some policy recommendations.

3.2. Research Setting: The Start Cup Emilia-Romagna

The Start Cup Emilia-Romagna program consists of 2 phases and has a duration of six months. The program starts in May and ends in October. Phase 1 includes training activities related to defining the business idea, business model, and pitching strategies. Phase 2 features training on cross-cutting topics (e.g., financial planning, IP, marketing). During this phase, participants must draft a business plan with the support of a dedicated mentor.

The selection process for the program follows a detailed procedure coordinated by ART-ER, involving the evaluation of applications by a committee of industry experts. In the 2017 and 2018 editions, a total of 40 projects were selected to enter Phase 1 of the program, while this number decreased to 20 in the 2019 edition. Regarding the training process, Phase 1 concludes with a pitching session before progressing to Phase 2. In 2017 and 2018, 20 projects advanced to Phase 2, but in 2019, this figure was further reduced to 10. Only in the 2018 edition was Phase 3 introduced. At the end of Phase 2 in the 2017 and 2019 editions and Phase 3 in 2018, a closing event took place, presenting the business plans to an audience of entrepreneurs, investors, and industry experts. A comparison of the similarities and differences in the training course across various editions is detailed in Table 3.1.

[9] STEMM = chemistry, pharmacy, engineering, mathematics, physics, natural sciences, medicine and dentistry, veterinary medicine; non-STEMM = architecture, economics and statistics, law, foreign languages, human sciences.

Table 3.1 – Similarities and differences of the Start Cup Emilia-Romagna program in 2017, 2018, and 2019.

Similarities	Differences
2017, 2018, 2019: • Applications are sent to the ART-ER offices and are reviewed by a committee of evaluators who are experts in the field. • The final pitch presentation takes place in October in front of an audience of entrepreneurs, investors, and experts in the field. 2017, 2018: • The same training was provided in Phase 1 and Phase 2. • 40 projects are selected for Phase 1. • 20 projects are selected for Phase 2.	2017, 2018, 2019: • In 2018 there is a phase 3 of training. • In 2019, there was a restructuring of training compared to 2017 and 2018. • In 2019, the program was reserved for innovative ideas from scientific laboratories exclusively.

3.3. The methodology and characterization of the sample

This chapter uses longitudinal data of individuals who applied to the Start Cup Emilia-Romagna program in the years: 2017,2018,2019. It includes both the accepted and rejected from the competition. The information at the individual level comes from the archival data of ART-ER. At the same time, the characteristics of their firms were extrapolated from the Aida Bureau van Dijk database[10] and compared with the Italian Chamber of Commerce database[11].

3.3.1. Candidates

In this chapter, we define " candidates" as an individual who applied to participate in the Start Cup Emilia-Romagna program in the year 2017 (N=135), 2018 (N=88), or 2019 (N=26) editions with a business idea. Below are some demographics.

[10] https://www.bvdinfo.com/en-gb/our-products/data/national/aida
[11] https://www.registroimprese.it/start-up-innovative

3.3.1a. Candidates and their characteristics

Gender. In comparison to the total number of candidates (N = 249), a significant majority of them are male, constituting 77%, while females make up the remaining 23%.

Age. On average, candidates are 38 years old: 71 candidates are between 20 and 30 years old (29%); 92 candidates are between 31 and 40 years old (37%); 52 candidates are between 41 and 50 years old (20%); 34 candidates are over 51 years old (14%).

Qualification. Out of a total of 148 candidates, 59% of the total, those with a university degree present different qualifications. Specifically, 29 individuals have a PhD (20%), 19 possess a postgraduate master's degree (13%), 13 have a single-cycle master's degree (9%), 63 have a master's degree (42%), and 24 have a bachelor's degree (16%).

University localization. Among the candidates for whom we have information on their university of study at the time of their Start Cup Emilia-Romagna application (N=148, including students, graduates, or researchers), 134 come from universities in Northern Italy (91%), 8 from Central Italy (5%) and 6 from Southern Italy (4%).

Degree type. Among the candidates for whom we have information regarding the degree course (N=146), the distribution is as follows: 9 are graduates in architecture (7%); 14 in chemistry (9.5%); 47 in economics and statistics (34%); 2 in pharmacy (1%); 8 in law (5.5%); 45 in engineering (30%); 2 in foreign languages (1%); 3 in mathematics, physics, natural sciences (2%); 4 in medicine and dentistry (3%); 1 in psychology (0.5%); 2 in motor sciences (1%); 2 in political science and international relations (1%); 5 in human sciences (3.5%); and 2 in veterinary medicine (1%). In summary, 63 (43%) obtained a degree in scientific subjects, while 83 (57%) obtained a degree in non-STEMM fields.

Table 3.2 - Demographic characteristics of candidates in aggregate form.

		Candidates (N=249)	
		n	**%**
Gender	Male	192	77
	Female	57	23
Age	20-30	71	29
	31-40	92	37
	41-50	52	20
	51 or more	34	14

Qualification	PhD	29	20
	Postgraduate master	19	13
	Single cycle	13	9
	Master's degree	63	42
	Bachelor's degree	24	16
University Localization	North	134	91
	Center	8	5
	South&Island	6	4
Degree Type	STEMM	63	43
	non-STEMM	83	57

Note: postgraduate master = postgraduate master's degree; Single cycle = single-cycle master's degree.

3.3.1b. Comparison of candidates between editions

After analyzing the characteristics of the candidates for the Start Cup Emilia-Romagna program for the three editions considered, it emerges that:

- In 2019, the average age of candidates was 40.6 years, marking an increase from the preceding years, with an average of 36.2 years in 2018 and 38.5 years in 2017.

- In 2017, male candidates made up 74% of the total, a percentage that rose to 80% in both 2018 and 2019. There is no statistically significant difference in age between candidates in the 2017, 2018, and 2019 editions.

Table 3.3 - Demographic variables of candidates: year 2017, 2018, 2019.

		Candidates 2017 (N=135)		**Candidates 2018 (N=88)**		**Candidates 2019 (N=26)**	
		n	**%**	**n**	**%**	**n**	**%**
Gender	Male	100	74	71	80	21	80
	Female	35	26	17	20	5	20
Age	20 - 30	33	25	33	38	5	20
	31 - 40	55	40	29	33	8	30
	41 - 50	26	20	19	22	7	27
	51 or more	21	15	7	7	6	23

- Among non-STEMM degrees, the discipline with the most candidates is economics and statistics, while among STEMM degrees, it is engineering.

- Over the years, there has been a substantial increase in candidates with a scientific degree. In 2017 (N=75), they made up 36% of the sample; in 2018 (N=55), the percentage rose to 42%, and in 2019 (N=19), it rose to 83%. The increasing

attractiveness of the Start Cup program for STEMM graduates in 2019 can be partly attributed to the fact that since that edition, universities have actively promoted the program among teams of researchers involved in the creation of academic spin-offs. It is supported by data showing that 48% of candidates in 2019 have a PhD.

Table 3.4 - Demographic characteristics of candidates: year 2017, 2018, 2019.

		Candidates 2017 (N=135)		Candidates 2018 (N=88)		Candidates 2019 (N=26)	
		n	**%**	**n**	**%**	**n**	**%**
Qualification	PhD	14	18	6	10	9	48
	Postgraduate master	9	11	10	16	0	0
	Single cycle	8	10	4	6	1	5
	Master's degree	30	38	25	40	8	42
	Bachelor's degree	14	17	10	16	0	0
	Other	5	6	8	12	1	5
University Localization	North	65	84	52	93	16	94
	Center	9	12	1	2	0	0
	South&Island	3	4	3	5	1	6
Degree Type	STEMM	27	36	23	42	15	83
	non-STEMM	47	64	32	58	3	17

Note: postgraduate master = postgraduate master's degree; Single cycle = single-cycle master's degree; Other = Undergraduate student or high school graduate.

3.4. Do the accepted and rejected differ?

To delve deeper into the characteristics of the participants, the following analysis focuses on the individuals accepted (N=100) and rejected (N=149) from the Start Cup Emilia-Romagna in the aggregate form. The analysis is further disaggregated for each specific year, i.e., 2017, 2018, and 2019, providing a comprehensive examination of selection outcomes and trends over the three years.

3.4.a. Characteristics of those accepted and rejected

Gender. 80% of those accepted are male, whereas this percentage is slightly lower for those rejected (75%).

Age. The average age of those accepted and rejected is not statistically different, being 37.6 and 38 years, respectively. However, it is noteworthy that 43% of the accepted fall

into the 31-40 age group, compared to 33% of the rejected.

Table 3.5 - Demographic variables of those accepted and rejected in aggregate form.

		Accepted (N=100)		Rejected (N=149)	
		n	**%**	**n**	**%**
Gender	Male	80	80	112	75
	Female	20	20	37	25
Age	20 – 30	25	25	46	30
	31 – 40	43	43	49	33
	41 – 50	20	20	32	22
	51 or more	12	12	22	15

Qualification. Among the candidates for whom qualification information is available (N=162), 18% hold a PhD. This percentage rises to 31% for accepted candidates (N=74) and falls to 8% for rejected candidates (N=88). In addition, 38% of candidates hold a master's degree. This percentage drops to 33% for accepted candidates and rises to 53% for rejected candidates.

University localization. 94% of those accepted graduated from universities in Northern Italy (against 87% of those rejected). This figure is consistent with the characteristics of the competition, which encourages the creation of enterprises in the Emilia-Romagna region.

Type of degree. 68% of those accepted have a STEMM degree (against 24% of rejections).

Table 3.6 - Demographic variables of those accepted and rejected in aggregate form.

		Accepted (N=100)		Rejected (N=249)	
		n	**%**	**n**	**%**
Qualification	PhD	23	31	6	8
	Postgraduate master	7	12	12	16
	Single cycle	10	14	3	4
	Master’s degree	24	33	39	53
	Bachelor’s degree	10	10	14	19
University Localization	North	62	94	72	87
	Center	1	1	7	8
	South&Island	3	5	4	5
Degree Type	STEMM	44	68	19	24
	non-STEMM	21	32	62	76

Note: postgraduate master = postgraduate master's degree; Single cycle = single-cycle master's degree.

3.4.b. Comparison between editions: accepted and rejected

After analyzing the characteristics of those accepted into the Start Cup Emilia-Romagna program for the editions considered, it emerges that:

- In 2019, the average age of those accepted was 39.7 years, recording an increase from previous years, where the average was 35.6 years in 2018 and 38.7 years in 2017.

- In 2017, male individuals accepted into the program accounted for 72% of the total. This percentage increased to 85% in both 2018 and 2019. There is no statistically significant difference in age among the accepted in 2017, 2018, and 2019.

Table 3.7 - Demographic variables of those accepted: 2017, 2018, 2019.

		Accepted 2017 (N=40)		Accepted 2018 (N=40)		Accepted 2019 (N=20)	
		n	**%**	**n**	**%**	**n**	**%**
Gender	Male	29	72	34	85	17	85
	Female	11	28	6	15	3	15
Age	20 - 30	5	13	16	40	4	20
	31 - 40	22	54	12	30	7	35
	41 - 50	7	18	9	22	6	30
	51 or more	6	15	3	8	3	15

- In 2017, those accepted with a PhD made up 40% of the total. This percentage drops to 13% for those accepted in the 2018 edition and increases to 57% for those accepted in the 2019 edition.
- In 2018, those accepted by universities located in the northern region accounted for 96% of the total. In 2017, this percentage dropped to 89%, while in 2019 increased to 92%.
- Regarding the type of degree, those accepted to the 2019 edition from scientific fields accounted for 100% of the total. This percentage dropped to 68% in 2017 and 56% in 2018.

Table 3.8 - Demographic variables of those accepted: 2017, 2018, 2019.

	Accepted 2017	Accepted 2018	Accepted 2019

		(N=40)		(N=40)		(N=20)	
		n	**%**	**n**	**%**	**n**	**%**
Qualification	PhD	11	40	4	13	8	57
	Postgraduate master	0	0	7	23	0	0
	Single cycle	1	4	1	3	1	7
	Master's degree	8	30	12	41	4	29
	Bachelor's degree	6	22	4	13	0	0
	Other	1	4	2	7	1	7
University Localization	North	24	89	27	96	11	92
	Center	2	7	1	4	0	0
	South&Island	1	4	0	0	1	8
Degree Type	STEMM	17	68	15	56	13	100
	non-STEMM	8	32	12	44	0	0

Note: postgraduate master = postgraduate master's degree; Single cycle = single-cycle master's degree. Other = Undergraduate student or high school graduate.

After analyzing the characteristics of those rejected from the Start Cup Emilia-Romagna program for the 2017, 2018, and 2019 editions, it emerges that:

- In 2017, the average age of those rejected was 38.4 years, higher than the previous year, 2018, where the mean was 36.7 years, and lower than in 2019, where it was 43.8 years.
- In 2018, rejected males accounted for 77% of the total. The percentage drops to 75% in 2017 and 67% in 2019. There is no statistically significant difference in age between those rejected in the 2017, 2018, and 2019 editions.

Table 3.9 - Demographic variables of the rejected: year 2017, 2018, 2019.

		Rejected 2017 (N=95)		**Rejected 2018 (N=48)**		**Rejected 2019 (N=6)**	
		n	**%**	**n**	**%**	**n**	**%**
Gender	Male	71	75	37	77	4	67
	Female	24	25	11	23	2	33
Age	20 - 30	28	29	17	35	1	17
	31 - 40	33	35	15	32	1	17
	41 - 50	19	20	12	25	1	17
	51 or more	15	16	4	8	3	49

- In 2017, individuals rejected with a master's degree accounted for 41% of the total. This percentage drops to 40% for those rejected from the 2018 edition and increases to 80% for those rejected from the 2019 edition.
- In 2017, individuals rejected coming from universities located in northern Italy, representing 82% of the total. This percentage rises to 89% in 2018 and 100% in 2019.
- Regarding the degree course, individuals rejected from the 2019 edition with non-STEMM backgrounds represent 60% of the total. This percentage drops to 71% in 2018 and rises to 80% in 2017.

Table 3.10 - Demographic variables of those rejected: 2017, 2018, 2019.

		Rejected 2017 (N=95)		Rejected 2018 (N=48)		Rejected 2019 (N=6)	
		n	**%**	**n**	**%**	**n**	**%**
Qualification	PhD	3	5	2	6	1	20
	Postgraduate master	9	16	3	9	0	0
	Single cycle	7	13	3	9	0	0
	Master's degree	22	41	13	40	4	80
	Bachelor's degree	10	18	6	18	0	0
	Other	4	7	6	18	0	0
University Localization	North	41	82	25	89	5	100
	Center	7	14	0	0	0	0
	South&Island	2	4	3	11	0	0
Degree Type	STEMM	10	20	8	29	2	40
	non-STEMM	39	80	20	71	3	60

Note: postgraduate master = postgraduate master's degree; Single cycle = single-cycle master's degree. Note: Other = Undergraduate student or high school graduate.

3.5. Candidates, accepted and rejected in the various phases and editions

After presenting an overview of the characteristics of candidates who were either accepted or rejected in the three editions of the Start Cup program, the focus now shifts to delineating the commonalities and differences between the two groups across different stages and editions of the competition.

2017 edition:

- There are 135 candidates for the Start Cup Emilia-Romagna program, of which 74% are male and 26% female.
- There is no difference between the average ages of those accepted and those rejected: they are 38.7 years and 38.4 years, respectively.
- 18% of the candidates (N=80) have a PhD. This percentage rises to 40% for those accepted (N=26) and falls to 6% for those rejected (N=49).
- 84% of the candidates (N=77) graduated from a university in Northern Italy. This percentage rises to 89% for those accepted (N=28) and falls to 83% for those rejected (N=48).
- 64% of the candidates (N=74) have a degree in non-STEMM disciplines. However, this percentage is only 26% among those accepted (N=27) and much higher, at 85%, among those rejected (N=47).

2018 edition:

- There are 88 candidates for the Start Cup Emilia-Romagna, 80% of whom are male and 20% female. The percentage of males rises to 85% for those accepted to Phase 1 (N=40) and falls to 77% for those rejected to Phase 1 (N=48). These percentages are very similar for those accepted to Phase 2 (N=40) and Phase 3 (N=19), where the percentage of males is 85% and 79% respectively. For those accepted to Phase 2 and Phase 3, the percentage of males drops to 79% (N=19) and 67% (N=9), respectively. The average age of those accepted to Phase 1 is 35.6 years. Slightly lower than the average age of those accepted to Phase 2 (36.7 years) and Phase 3 (38.9 years).
- 11% of candidates have a PhD. This percentage increases for those accepted to Phase 1 (14%). The percentage of candidates holding a PhD in Phase 2 (14%) and Phase 3 (20%) is slightly higher. Respectively, the percentage rises to 20% for those accepted to Phase 2 and drops to 17% for those accepted to Phase 3.
- 58% of candidates have a bachelor's degree in non-STEMM disciplines. This percentage, however, is only 40% among those accepted and much higher, equal to 75%, among those rejected in Phase 1. On the other hand, 40% of candidates in Phase 2 have a degree in a non-STEMM field, compared to 27% of candidates in Phase 3. These percentages, respectively, drop to 27% among those accepted at Phase 2 and rise to 33% among those accepted at Phase 3.

2019 edition:

- There are 26 candidates for the Start Cup Emilia-Romagna program, of which 81% are male and 19% female. The percentage of males rises to 85% for those accepted at Phase 1 (N=20) and drops to 77% for those rejected at Phase 1 (N=6). The percentage of candidates in Phase 2 is similar to the previous phase. Specifically, among candidates in Phase 2 (N=20), 85% of the sample is male.
- The average age of those accepted at Phase 1 is 39.7 years, higher than the average age of those accepted at Phase 2 (36.9 years).
- There is homogeneity in the location of the university of origin among the candidates in Phase 1 and Phase 2 of the Start Cup Emilia-Romagna program. In both phases, 100% of the sample comes from northern Italy.
- 47% of Phase 1 candidates (vs. 57% of Phase 2 candidates) hold a PhD. This percentage, however, rises to 57% among those accepted and drops to 20 % among those rejected in Phase 1.
- Individuals with STEMM degrees represent 83% of the total candidates in this phase. This percentage rises to 100% for Phase 2 candidates.

3.6. Founders

A founder is an individual who, at the time of establishment of an enterprise, holds part or all of its share capital. Methodologically, it is identified by consulting the Aida Bureau van Dijk database in the year 2022. The data reveal that 99 of those who applied to the Start Cup Emilia-Romagna program in the years under analysis - including 43 among those accepted (43%) and 56 among those rejected (57%) - are founders of 131 firms. Of the 99 founders, 61 were candidates in the year 2017 (62%), 28 in 2018 (28%), and 10 in 2019 (10%). Among them, 23 were accepted (vs. 38 rejected) by the Start Cup Emilia-Romagna program in 2017; 12 were accepted (vs. 16 rejected) in 2018; and 8 were accepted (vs. 2 rejected) in 2019.

Table 3.11 - Overview of the founders in the 2017, 2018, and 2019 editions.

Founders	2017	2018	2019	Total
Start Cup candidates	61	28	10	99
of which: Accepted	23	12	8	43

of which: Rejected	38	16	2	56

3.6.1. Characteristics of the founders

Gender. Confirming the widespread male prevalence in the entrepreneurial field, most founders are male (82%).

Age. The average age of the founders is 38.3 years. 26 founders are between 20 and 30 years old (26%); 36 founders are between 31 and 40 years old (36%); 37 founders are between 41 and 65 years old (38%).

Qualification. Among the founders for whom we have information on their educational qualifications at the time of application (N=50), 9 have a PhD (18%); 5 have a postgraduate master's degree (10%); 4 have a single-cycle master's degree (8%); 20 have a master's degree (40%), 12 have a bachelor's degree (24%).

University localization. Among the 50 founders, 34 came from universities in Emilia-Romagna (69.4%); 4 from universities in Lombardy (8.2%); 3 from universities in Lazio (6.1%); 8 from universities in Marche, Piedmont, Tuscany, Trentino, and Veneto (16.3%).

Regarding the differences between the founders who were accepted vs rejected from the Start Cup Emilia-Romagna:

- 82% of founders are male. This percentage drops to 77% among founders who participated in the Start Cup, while it rises to 88% for founders who were rejected from the program.
- There are no statistically significant differences between the age of the founders accepted into the program and those rejected. The most represented age group for both groups is 31-40 years (38% for accepted, 36% for rejected).

Table 3.12 - Demographic variables of founders: accepted vs. rejected and founders.

		Founders (N=99)		**Accepted and Founders (N=43)**		**Rejected and Founders (N=56)**	
		n	**%**	**n**	**%**	**n**	**%**
Gender	Male	81	82	33	77	49	88
	Female	18	18	10	23	7	12
Age	20 - 30	26	26	12	28	14	25
	31 - 40	36	36	16	38	20	36
	41 - 50	24	25	9	20	15	27

51 or more	13	13	6	14	7	12

- Both 40% of the accepted and rejected founders obtained a master's degree. 32% of the founders accepted to the program had obtained a PhD, compared to 4% of the rejected founders.
- 92% of the founders accepted to the Start Cup obtained a degree from universities located in Northern Italy, compared to 88% of the rejected founders.
- 64% of the founders accepted to the program have a STEMM degree, compared to 24% of the rejected ones.

Table 3.13 - Demographic variables of founders: accepted vs. rejected and founders.

		Founders (N=99)		**Accepted and Founders (N=43)**		**Rejected and Founders (N=56)**	
		n	**%**	**n**	**%**	**n**	**%**
Qualification	PhD	9	18	8	32	1	4
	Postgraduate master	5	10	1	4	4	16
	Single cycle degree	4	8	1	4	3	12
	Master's degree	20	40	10	40	10	40
	Bachelor's degree	12	24	5	20	7	28
University Localization	North	45	90	23	92	22	88
	Center	5	10	2	8	3	12
	South&Island	0	0	0	0	0	0
Degree Type	STEMM	22	44	16	64	6	24
	non-STEMM	28	56	9	36	19	76

Note: postgraduate master = postgraduate master's degree; Single cycle = single-cycle master's degree.

Finally, we investigate the possible differences between those accepted and rejected from the program who did not start a company.

- Among the 57 individuals accepted into the Start Cup Emilia-Romagna program who did not start a company, 17 participated in the 2017 edition, 27 in the 2018 edition, and 13 in the 2019 edition.
- Among the 93 individuals rejected from the Start Cup Emilia-Romagna program who had not started a company, 57 participated in the 2017 edition, 32 in the 2018 edition, and 4 in the 2019 edition.
- 82% of the individuals accepted into the Start Cup who have not founded businesses are men, while among those rejected who are non-founders, 67% are men.

- 47% of the accepted non-founders are included in the 31 – 40 age group, a percentage that drops to 31% among rejected non-founders.

Table 3.14 - Demographic variables of non-founders: accepted vs. rejected non-founders.

		Non-founders (N=150)		Accepted non-Founders (N=57)		Rejected non-Founders (N=93)	
		n	**%**	**n**	**%**	**n**	**%**
Gender	Male	110	73	47	82	63	67
	Female	40	27	10	18	30	33
Age	20 - 30	45	30	13	23	32	35
	31 - 40	56	38	27	47	29	31
	41 - 50	29	19	11	20	18	19
	51 or more	20	13	6	10	14	15

- 34% of the accepted non-founders have a PhD, while this percentage drops to 9% for the rejected non-founders.
- 95% of the accepted non-founders have a qualification obtained in northern Italy, while this percentage decreases to 85% for the rejected non-founders.
- 77% of accepted non-founders had a STEMM degree, compared to 34% of rejected non-founders.

3.7. Firms founded by candidates

This section is devoted to the characterization of the firms founded by candidates. Specifically, as of January 2022, there are 131 firms founded by 99 candidates (of the 2017, 2018, and 2019 editions). Thus, there is no 1:1 correspondence between the firm and the individual. In some cases, the same individual was founding more than one company. It is important to emphasize that not all companies were founded during or at the end of the Start Cup: 16 companies (13%) were founded before entering the program, while the remaining 115 (87%) were founded during or after the Start Cup, on average within 3 years. When considering only those accepted, only 8% of the companies were founded before the Start Cup. Finally, it is interesting to note that 23% (N=30) of the companies founded are innovative startups. In the Emilia-Romagna[12] region, only 4.1% of new companies have the requisites to be classified as

[12] https://www.mimit.gov.it/images/stories/documenti/Report_Infocamere_3_trimestre_2021.pdf

innovative startups. The characteristics of the 131 companies founded by candidates are analyzed below and refer to January 2022.

Legal form[13] **and size.** Among the 131 firms founded by candidates, we have 1 consortium, 8 sole proprietorships, 4 S.C.A.R.L.P.A., 4 S.P.A., 89 S.R.L., 18 S.R.L. simplified, 1 S.N.C. and 6 S.A.S. Using the classification from the European Commission[14]'s Recommendation 2003/361, all of these are microenterprises, with an average annual revenue below 2 million euros.

Geographic distribution. 86% percent of the companies are in northern Italy, 8% are located in central Italy, and 6% are located in the South and island. The regions with the highest number of companies are Emilia-Romagna (73 companies), Lombardy (25 companies), Lazio and Veneto (5 companies each).

Regarding the differences between enterprises founded by individuals accepted vs excluded from the program:

- Of the 131 firms founded by candidates for the program, 61 were founded by individuals accepted to the program, and 70 were founded by individuals rejected. Of the 61 companies born from individuals accepted, 21 are innovative startups (33%). In contrast, only 9 of the 70 firms born from individuals excluded from the competition are innovative startups (13%).
- 72% of the firms founded by accepted are S.R.L.'s (vs. 64% excluded); 12% are simplified S.R.L.'s (vs. 16% excluded); 7% are S.P.A.'s (vs. 0% excluded); 3% are S.A.S. (vs. 6% excluded); and 3% are sole proprietorships (vs. 9% excluded).
- 94% of the firms founded by the accepted are in northern Italy, while this percentage decreases to 80% for the firms founded by the excluded.
- Of the 131 companies founded by candidates for the Start Cup program, 23% (N=30) are innovative startups established under the same business name as the Start Cup project or under a different business name but with the same technology.

[13] SC.A.R.P.A. = società consortile; S.P.A = società per azioni; S.R.L. = società a responsabilità limitata; S.R.L. semplificata = società a responsabilità limitata semplificata: S.N.C = società in nome collettivo; S.A.S. = società in accomandita semplice.

[14] https://www.certifico.com/news/22-news/news-generali/9232-raccomandazione-2003-361-ce

- 7 of the Start Cup candidates' projects in the 3 years of observation, of which no formal correspondence could be identified between the candidates to the program and the company established through the use of business registries, were established under the same or different business name by a founder other than the candidate to the program.
- 15% of the projects that have navigated the Start Cup program in the three years of observation (N=37) today are " innovative startups," born within three years of the end of the competition.

3.8. Conclusions and recommendations

In this chapter, the demographic characteristics of candidates, those accepted and those rejected by the Start Cup Emilia-Romagna, were analyzed. First, the candidate selection process and the training received by those accepted to the programs in the 2017, 2018, and 2019 editions are described. Following, we provide an overview of the characteristics of candidates, comparing them to those accepted and those rejected. We then focus on the specificity of each cohort to highlight similarities and/or differences between the different groups. The focus was then placed on the characteristics of the founders who applied for participation in the program. We analyzed the differences between (1) individuals who were accepted or rejected by the program and started a business and between (2) founders and individuals accepted and rejected by the program who did not start a business. In general, we can draw the following conclusion:

1. The Start Cup Emilia-Romagna program attracts entrepreneurial-minded individuals who, regardless of acceptance into the program, start entrepreneurial activities in a significant way (99 out of 249, about 40%).

2. The relevance of the Start Cup in providing the tools to create a new enterprise is evident: more than 90 percent of those who are accepted into the program and do business establish the firms during or soon after the completion of the program. This percentage drops to 80% for those excluded (in this case, the enterprise is founded within 3 years of exclusion).

3. More than 23% of the firms founded are innovative startups (vs. 4% of innovative startups founded per year out of the total number of new companies in Emilia-Romagna). This percentage rises to more than 28% when considering projects that originated innovative startups not founded by the candidate but by other team participants connected to the project. It demonstrates the added value of the program in

promoting highly innovative business ideas.

4. Interestingly, 66% of candidates who found a business did so in Emilia-Romagna (while the remaining 34% found the business in another Italian region). The percentage rises to more than 70% among accepted founders while decreasing to 60% for those excluded. Among those who founded a business in Emilia-Romagna, nearly 3 % did not study in Emilia-Romagna (a percentage that drops to 20% among accepted founders and rises to 40% among excluded founders). In addition, the data evidenced some interesting patterns: (i) about 50% of the founders who studied in Emilia-Romagna chose to set up their own business in the same region, indicating a strong connection between education and local entrepreneurial activity (among these, 56% were the founders accepted into the program vs. 38% of the excluded founders); (ii) 18% of the founders who studied outside Emilia-Romagna chose to do business in Emilia-Romagna. The percentage rises to almost 25% among excluded founders, while it drops to 13% for those accepted.

5. In line with the academic and policy literature that has extensively documented the gender gap in tertiary education end entrepreneurship in STEMM fields, the Start Cup Emilia-Romagna program is also affected by an imbalance in terms of female participation. The percentage of women who apply to participate in the Start Cup Emilia-Romagna program is lower than men. This percentage decreases further if we focus on those admitted to the program. Considering the European Union's new strategic orientations on gender equity[15], it is recommended that we reflect on how to support increasing diversity and inclusion in the program, not only concerning the female dimension but also other dimensions of individual identity that may be underrepresented (e.g., race or ethnicity, nationality, disability).

The Start Cup is an incubator of talent and a source of inspiration for local entrepreneurial growth, providing a stimulating environment where young people can explore and develop their entrepreneurial skills, thus helping to promote innovation and economic development.

The study contributes to the literature on pre-incubation and offers useful recommendations for policymakers to improve the effectiveness and inclusiveness of pre-

[15] https://ec.europa.eu/newsroom/just/items/682425/en

incubation programs such as Start Cup Emilia-Romagna. By understanding the demographic characteristics of program participants, the timing and nature of business creation, and the program's impact on innovation and regional development, policymakers can design more targeted and impactful policies and entrepreneurial initiatives. First, the findings contribute to the existing literature by providing insights into the types of individuals attracted to entrepreneurship programs and the effectiveness of the program in promoting entrepreneurial ventures. It emphasizes the importance of the Start Cup Emilia-Romagna program in facilitating the creation of new businesses, particularly among successful applicants. This is in line with the literature that suggests that pre-incubation programs can play a crucial role in fostering the launch of new businesses. Second, the results highlight the program's role in fostering innovative business ideas, as evidenced by the percentage of innovative startups founded by program participants relative to the overall rate in the region. Policymakers can use this information to prioritize funding and support for programs that promote innovation and technological entrepreneurship. Third, the results shed light on the regional impact of the Start Cup Emilia-Romagna program, with a significant percentage of companies founded in the region. This underscores the program's contribution to local entrepreneurial growth and suggests a strong connection between education and entrepreneurial activity in the region. Policymakers can use this knowledge to strengthen regional entrepreneurial ecosystems by supporting initiatives that encourage entrepreneurship among local talent and attract outside entrepreneurs to the region.

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3.10. Sitography

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Appendix

A1. Details of training

Phase 1 The first phase of the competition includes two days of training. The objective is to define the business model of the entrepreneurial ideas and structure them in an effective pitch

deck. In 2017 and 2018, this phase ended with a pitching session. Following the pitches of business ideas, the top 20 are selected for Phase 2. In line with previous years, the 2019 competition also concluded Phase 1 with a pitching session, from which up to 10 entrepreneurial projects were selected to proceed to Phase 2.

Table A3.1 - Contents of phase 1 training in the 2017, 2018, and 2019 editions.

Phase 1: training contents		
2017 edition	**2018 edition**	**2019 edition**
• Startup presentation	• Startup presentation	• Theoretical lesson on the definition of the business model and pitch deck
• Theoretical lesson " How to pitch"	• Theoretical lesson " How to pitch"	• Theoretical lesson " How to pitch"
• One-to-one for pitch deck realization	• One-to-one for pitch deck realization	/
• Pitch presentation and Q&A session	• Pitch presentation and Q&A session	/
• Pitch deck feedback from mentors	• Pitch deck feedback from mentors	/

Phase 2 In 2017 and 2018, Phase 2 of the competition entailed a five-day training program dedicated to the 20 entrepreneurial projects that successfully navigated Phase 1. These days were structured with group work and discussion sessions aimed at advancing the development of the business idea. The top 10 proposals from the ranking list proceeded to Phase 3 of the Start Cup Emilia-Romagna. In 2019, Phase 2 of the competition comprised three days of frontal training focused on the business plan, supplemented by approximately a week of training covering topics such as intellectual property (IP) and brand, design thinking, HR, and people development, among others.

Table A3.2 - Contents of phase 2 training in the 2017, 2018, and 2019 editions.

Phase 2: training contents		
2017 edition	**2018 edition**	**2019 edition**
• Each team presents their pitch and receives feedback and ideas from the mentors	• Each team presents their pitch and receives feedback and ideas from the mentors	• Theoretical lesson on the business plan
• Theoretical lesson " How to pitch"	• Theoretical lesson " How to pitch"	• Theoretical lesson on IP, trademarks, copyright, privacy and GDPR
• Mentoring and individual coaching pt.1	• Mentoring and individual coaching pt.1	• Theoretical lesson on design thinking
• Financial and economic planning	• Financial and economic planning	• Theoretical lesson on HR and people development in the company
• Go to market: theory on how to identify customers, market, and commercial strategy	• Go to market: theory on how to identify customers, market, and commercial strategy	• Theoretical lesson on venture capital and sources of finance
• Mentoring and individual coaching pt.2	• Mentoring and individual coaching pt.2	• Theoretical lesson on corporate law, contracts, and clauses: rights/duties adopted in the context of startup investments
• Role model	• Role model	• Theoretical lesson on economic and financial KPIs that an entrepreneur can adopt in managing his company
• Fundraising: theory on how to manage	• Fundraising: theory on how to manage	• Intervention by "Role model (entrepreneur

relationships with investors	relationships with investors	and VC)" on fundraising: how to relate to external investors. Participants can present the pitch to the host and receive direct feedback
• Mentoring and individual coaching pt.3	• Mentoring and individual coaching pt.3	• Theoretical lesson on corporate structure, spin-offs, business creation, and governance processes
• Pitching to investors with a Q&A session	• Pitching to investors with a Q&A session	/

Phase 3 Participants receive guidance from mentors as they craft their business plans. The culmination of this process is the final business plan presentation event held in October, where the 10 finalist projects showcase their entrepreneurial concepts in front of an audience comprising entrepreneurs, investors, and industry experts. Following the conclusion of the final event, the committee assesses whether the projects fulfill the formal eligibility requirements for participation in the PNI.

Table A3.3 - Contents of phase 3 training in the 2018 edition.

Phase 3: training contents
2018 edition
• Economic-financial preparation of the business plan
• Individual meetings to finalize the business plan
• Theoretical training on the graphic setting of the pitch deck
• Coaching day with 10 mentors from the industrial world selected based on the reference sector of business ideas

4. PAPER II - QUALITATIVE

Do Career Preferences of Early-career Academics Drive Entrepreneurial Learning in Pre-Incubation Programs?[1]

ABSTRACT

This study examines whether career preferences among early-career academics drive their entrepreneurial learning in pre-incubation programs. This research aims to answer the following question: *Do career preferences of early-career academics influence entrepreneurial learning in pre-incubation programs?* We employ a longitudinal case study design. Data collection involves a combination of semi-structured interviews, field observations, web materials, and surveys. We find that early-career academics vary in their research orientation, encompassing a preference for industry or science. These orientations guide the mechanisms of learning within a pre-incubation program, along with their outcomes. The study contributes to the literature on entrepreneurial learning in pre-incubation programs and offers implications for managers and policy makers.

Keywords: career-preferences; entrepreneurial learning; pre-incubation programs; entrepreneurship education

[1] A version of this paper has been accepted at the Academy of Management Conference 2024, in Chicago, co-authored with Daniela Bolzani. Previous version of this paper has been presented at: R&D Management PhD Colloquium (in Trento, Italy) in July 2022; 3E - ECSB Entrepreneurship Education PhD Colloquium (Aarhus University, Denmark) in May 2023, co-authored with Daniela Bolzani.

4.1. Introduction

In recent years, there has been a growing interest among scholars in entrepreneurship education and training offered by pre-incubation programs (Davey et al., 2016). A pre-incubation program is defined as a facility that supports embryonic business (before birth) by providing training and support for aspiring entrepreneurs and startup teams during their planning stage (Bielicki, 2023). These programs have become increasingly important in fostering mindsets and behaviors among participants (Arias et al., 2018) and in developing entrepreneurial competencies that are functional for careers in entrepreneurship and beyond (Baggen et al., 2017). Consequently, they play a key role in bridging public policy to local economic growth (Lamine et al., 2018), as they foster the commercialization of innovation (Callaert et al., 2015; Hottenrott & Richstein, 2020). Typically, such programs target graduates or scientists who are in the early stages of their career decisions (hereafter early-career academics) (Lyons & Zhang, 2018). By focusing on certain types of individuals, the support provided by these programs has been shown to produce different results: from no treatment effects (Souitaris et al., 2007), to a decrease in entrepreneurial intention (Oosterbeek et al., 2010), or positive effect on new firm creation (Lyons & Zhang, 2018). Indeed, empirical evidence of the impact of entrepreneurship education and training courses by pre-incubation programs is inconclusive (Elert et al., 2015). In addressing this need, we noted that among prior studies, none have considered the career preference of early-career academics[2] engaging in pre-incubation programs. Since most pre-incubation programs require participants to navigate the intersection of science and industry domains (Perkmann et al., 2019), this environment serves as a testing ground for "trying on" an entrepreneurial career (Longva et al., 2020). Consequently, we suggest that for a complete understanding of the effectiveness of pre-incubation programs it is necessary to consider the career preference of incubates.

Our core argument is that different career preferences might clarify the mechanisms through which individuals learn in pre-incubation programs and the outcomes that result. This new research perspective holds promise for fully understanding the learning mechanisms that occur in these contexts (Metcalf et al., 2021; Stolz & Sternberg, 2022). The issue of the effects of career preference is reinforced for academic engagement in pre-incubation settings, where

[2] We refer to early-career academics as scientists who are in the early stages of their academic careers, typically recent graduates; those who are in the early years of their PhD program, or shortly after completing their doctoral research or obtaining an academic position. These scientists are relatively new to the field, actively working to establish their reputation, gain teaching and research experience, and shape their academic careers. In this definition, we include university students engaged in research groups as part of their academic commitment.

the parties involved are incentivized to pursue both scientific and inventive goals. We aim to answer the following: *Do career preferences of early-career academics drive entrepreneurial learning in pre-incubation programs?* To do so, we examine the characteristics of early-career academics participating in a pre-incubation program in Italy called Start Cup Emilia-Romagna. We employ a longitudinal case study design. Data collection involves a combination of semi-structured interviews, field observations, web materials, and surveys.

Three main findings emerge from this study. First, participants in the pre-incubation program express two distinct research orientations (taste for science and taste for industry). Second, the pre-incubation program provides entrepreneurship education and training to incubates, guiding them to develop a distinct understanding of their career preferences (affirming or rejecting a preference for an entrepreneurship (academic) career). Third, the program provides valuable entrepreneurial competencies useful for entrepreneurship or other careers.

This research contributes to the literature on entrepreneurial learning in pre-incubation programs (Williams Middleton & Donnellon, 2014; Redondo & Camarero, 2017; Ting et al., 2017; Wolf, 2017) explaining how career preferences of early-career academics influence the learning process in pre-incubation programs. The study provides managerial and policy implications. For managers, the findings suggest recognizing the diversity of participants' career preferences during the selection process, to ensure that it is in line with the objectives and design of the program. In terms of policy, the study suggests emphasizing support for networking and access to resources to promote (academic) entrepreneurship and accelerate the commercialization of scientific results. The rest of the paper is structured as follows. First, we present the theoretical considerations of the study. Second, we describe the methodology, followed by the findings. Finally, we conclude the paper with the discussion and implications sections.

4.2. Theoretical Considerations

4.2.1. Career preferences of early-career academics

Recent literature on academic engagement[3] explores how the diverse research orientations of early-career academics are linked to scientific and inventive outputs (Plantec et

[3] Academic engagement can be referred to as "knowledge-related interactions by academic researchers with nonacademic organizations, as distinct from teaching and commercialization. These interactions include collaborative research, contract research [...]" (Perkmann et al., 2021, p.1).

al., 2023). This evidence is built upon the groundwork laid by Roach & Sauermann (2010), who emphasized potential heterogeneity in researchers' preferences for science that predicts future careers in industry versus academia. An underlying theme in much of this research is that academically trained scientists have a strong taste for science, e.g., preferring upstream research, freedom in the choice of research projects, publication, and interactions with the scientific community, whereas in industry this is not the case (Stern, 2004; Aghion et al., 2008; Lacetera, 2009).

However, prior studies on pre-incubation programs have neglected to explore whether the research orientation of early-career academics correlates with distinct career preferences in (academic) entrepreneurship[4]. We argue that within pre-incubation programs, early-career academics can manifest two distinct career preferences in academic entrepreneurship based on their research orientation. On the one hand, there are those who priorities the use of research results for scientific and inventive purposes, seeking autonomy in the selection of projects and placing the emphasis on scientific publications. On the other hand, some are inclined to exploit the results of their research for commercialization purposes (Lacetera, 2009). Depending on their research orientation, participants in pre-incubation programs may demonstrate a different commitment in their entrepreneurial activities.

This underexplored territory of different career preferences among early-career academics in pre-incubation programs deserves attention. Within these programs, participants engage in career exploration, to gain insights into (academic) entrepreneurship as a potential career path (Porfeli & Lee, 2012). At the same time, they assess the compatibility of this path with their career aspirations through active or passive involvement in pre-incubation activities, thereby developing entrepreneurial skills that have value not only within academia but also in broader professional contexts. For individuals for whom academic entrepreneurship is not in line with their aspirations, this exploration phase within pre-incubation programs may lead to a re-evaluation of entrepreneurship as a viable career option, leading to a reassessment of existing commitments.

[4] Academic entrepreneurs are viewed as "those higher education actors who innovatively leverage internal and external opportunities to not only generate economic resources for their profit or in support of their academic units and institutions but also to create within the academy social and political change platforms" (Mars & Rios-Aguilar, 2010).

4.2.2. Entrepreneurial learning in pre-incubation programs

Early-career academics who aim to commercialize the results of their research often rely on the support offered by academic institutions (Mathisen & Rasmussen, 2019). In this context, pre-incubation programs act as learning facilitators for participants, with the primary goal of increasing their entrepreneurial intentions (Liñán, 2004). Depending on their organizational structure (e.g., nonprofit, or for-profit) and the range of services offered (Bergman & McMullen, 2022), pre-incubation programs play a key role in equipping early-career academics with entrepreneurial skills that are relevant not only for entrepreneurship but also for broader career paths (Secundo et al., 2020; Gupta & Etzkowitz, 2021).

Typically, learning in pre-incubation programs takes place in workspaces and innovation labs equipped with resources such as 3D printers or experimentation facilities (Wolf, 2017). These physical spaces act as hubs for entrepreneurial teams, fostering collaboration and the exchange of ideas not only within one's own team but also between different teams. Learning also occurs through indirect support from external actors, such as in areas related to finance or accounting (Ting et al., 2017), as well as through structured entrepreneurship education and training activities (Williams Middleton & Donnellon, 2014; Redondo & Camarero, 2017). Pre-incubation programs can adopt experiential teaching approaches to varying degrees. Programs that emphasize experiential approaches often focus on refining entrepreneurial ideas during their early stages. This process typically involves organizing ideas into a comprehensive business plan to assess project feasibility and may include activities such as conducting market research to assess demand (Bezerra et al., 2017), thus facilitating trial-and-error learning (Colombo et al., 2016). Entrepreneurship education and training initiatives offered by pre-incubation programs often involve collaborative projects between entrepreneurial teams and external stakeholders (Fong, 2020), fostering continuous interaction between incubates and potential investors, which may include events such as demonstration days (Hagebakken et al., 2021). Furthermore, the continuous support of coaches and mentors (Wolf, 2017) contributes to learning by continuously assessing the feasibility of the business idea within a feedback loop (Kenney & Patton, 2011). In contrast, pre-incubation programs that adopt a less experiential approach often organize training activities in structured phases (Williams Middleton & Donnellon, 2014), covering topics essential to entrepreneurship such as marketing strategies, tax management and legal aspects (Boukamcha, 2015; Zheng et al., 2017). However, access to pre-incubation services is typically not available to all applicants and strict selection processes are often applied (Assenova, 2020; Fong, 2020; Secundo et al.,

2020) limiting support for business start-ups to a select cohort of individuals (Mansoori et al., 2019).

4.3. Methods

To answer the research question of this study, we use a longitudinal case study methodology. This choice is in line with our research objective, as it allowed us to comprehensively examine the structure of the pre-incubation program and the behavior of the individuals involved in the process over time.

4.3.1. Research setting

The context of our research is a business plan competition hosted by a pre-incubation program. Business plan competitions are considered an appropriate research context for their potential to facilitate business creation (Watson et al., 2018) and for their widely recognized practical approach (Jones et al., 2021). In particular, the competition model offered by the Start Cup Emilia-Romagna 2022[5], provides an immersive six-month program designed to foster collaboration between different actors, including academics (graduates, PhDs, post-docs, and professors), coaches, mentors, industrial experts, venture capitalists and role model entrepreneurs. Admission to the program involves several stages. Initially, participants undergo a screening phase, during which they provide a detailed description of their business idea, target market, team composition, patent status, level of technological readiness and other relevant personal information. After the screening phase, participants move on to Phase 1 of the program, called Bootcamp. This phase lasts three days and focuses on training sessions on business models and value propositions. The Bootcamp culminates with a pitching day, where participants present their business ideas to a panel of industry experts. Subsequently, the jury selects a maximum of ten projects that advance to Phase 2 of the program. During Phase 2, the selected projects undergo intensive entrepreneurial training and engage in weekly interactions and discussions with mentors specialized in various fields, including ICT, Life Science, Industrial and Cleantech & Energy. The focus of this phase is the development of the final document, the business plan. During this phase, additional industry events are organized online, with experts from outside academia giving 30-minute speeches, thus enhancing the learning experience for participants. The culmination of the competition takes place during a final pitch session, where participants present their projects to venture capitalists and a jury of experts

[5] https://www.startcupemiliaromagna.it/il-bando-2022/

chosen by the pre-incubation program managers. During this event, three projects are declared winners of the competition.

4.3.2. Data Collection and description of participants

For data collection, we followed the common recommendations for ethnographic work (Van Maanen, 1979) by employing a multi-method approach that combined archival documents, participant observations, semi-structured interviews, and informal discussions. These different data sources were then integrated through triangulation (Yin, 2009) and supplemented with surveys. Fieldwork began in May 2021 by contacting the project manager and the director of the pre-incubation program and continued after receiving official permission to enter the field. Data collection lasted from June 2022 to June 2023. During these 12 months, the first author attended several project meetings and social events, conducted interviews, and engaged in informal conversations with participants, coaches, mentors, and pre-incubation program managers. Data sources included two sets of semi-structured interviews and surveys (conducted before and eight months after the competition), web articles and 92 hours of direct observation.

– – Insert Table 4.1 about here – –

During the study period, three phases of data collection were identified.

First, semi-structured interviews were conducted to explore various aspects of the participants, including their motivations, expectations from the training courses and career preferences before participating in the program. In total, there were 50 applicants, all of whom were selected to participate in the pre-incubation program. Of these 50 applicants, 31[6] agreed to the survey. To ensure representation of various sectors (ICT, Life Science, Industrial, Cleantech & Energy), the first author used random sampling to select ideas, choosing to conduct interviews with 20 people from 9 different teams. The interviews were conducted in June 2022 using platforms such as Teams or Zoom and lasted an average of 40 minutes. The interview protocol is structured in six sections. The first section asks general questions about the conception of the business idea. The second section delves into the interviewee's previous commitment to entrepreneurship and training courses. The third section aims to assess the skills

[6] We collected survey responses both before and after the competition from this cohort of 31 participants. The data obtained from their responses served as a robustness check, thereby enhancing the reliability of the information garnered through the comprehensive semi-structured interview process.

of individuals at the beginning of the pre-incubation process. The fourth and fifth sections, on the other hand, analyze the applicants' motivations for applying for the program and their expectations, respectively. The last section examines the respondents' short-term and long-term entrepreneurial intentions.

Second, a period of direct observation was devoted to observing the delivery of the training courses. During this phase, regular informal interviews were held with key informants from the pre-incubation management team.

Third, a second phase of semi-structured interviews was collected eight months after the end of the competition, in June 2023, involving 11 participants. Interviews were conducted via platforms like Teams or Zoom, with an average of 25 minutes. The interview protocol was structured in six distinct sections. The first section focused on the evolution of the business idea almost one year after the conclusion of the pre-incubation. The second section delved into the skills acquired in the pre-incubation program. Sections three and four were devoted to exploring whether individuals' initial motivations and expectations were realized after the start of the competition. Section five probed participants' career preferences.

4.3.3. Data analysis

The data analysis took place in four stages.

Step 1. First, the analysis process involved the integration of field notes obtained during participant observations with archival documents. These materials served as valuable resources to familiarize us with the research context and to establish an initial understanding of the dynamics of teaching and learning within the pre-incubation program. In addition, they provided insight into the entrepreneurship training experience from the perspective of the entrepreneurs, program managers and coaches. All these materials were meticulously organized within a specially created working document, which also included photographs captured during the training sessions and group activities. This analysis aimed to gain an in-depth understanding of the various aspects of entrepreneurship training, including both the tangible results and the cognitive dynamics of the individuals involved. In this phase, information on the team's composition, the training received, and the identity of the coaches or mentors was systematized. Through this process, an initial but comprehensive understanding of the study context and its main stakeholders was achieved.

Step 2. In the second phase of data analysis, we used the interview data to examine the mechanisms and learning outcomes that were supported and implemented, as indicated by the

informants and materials. The analysis of the interviews followed the established procedures by Corley & Gioia (2004). First, we used the interview transcripts as the primary dataset to conduct the analysis, supplemented by the field notes to reinforce and direct the emergence of the categories. In a preliminary step, we performed open coding for each interview, systematically examining relevant information that could help us answer our guiding questions, such as: What type of training was most useful for the participants? Which entrepreneurial skills were developed? Following multiple readings of the data, we identified concepts in the data and grouped them into categories (Strauss & Corbin, 1998). As the analysis proceeded, our understanding of the context deepened, leading us to refine the codes and establish a set of first-order codes for each guiding question (Corley & Gioia, 2004). This phase was crucial for exploring emerging patterns within the collected data. Interview transcriptions and coding were performed using NVivo 1.7.1 software.

Step 3. As core categories emerged from the analysis, we proceeded with axial coding (Strauss & Corbin, 1998), which involved the grouping of convergent categories and the generation of second-order codes to reduce the number of concepts. This iterative process continued until data saturation was reached. During the qualitative data analysis phase, after identifying the first- and second-order codes, we focused on understanding the interrelationships between the categories. We began to scrutinize the emerging relationships between these categories, to discover their underlying connections. The integration of on-site observations with archival documents and informant interviews allowed us to delineate two distinct approaches to learning mechanisms during the pre-incubation program. This analysis provided us with a richer and more detailed perspective of how individuals navigate and internalize educational experiences, thus contributing to a deeper understanding of learning processes within the pre-incubation program.

Step 4. In the last stage of data analysis, we used the survey data, which operationalized the key constructs identified in the qualitative study. We performed t-tests on the survey items to assess pre- and post-training differences in terms of intention, action, knowledge, and entrepreneurial skills. These tests show the statistical significance of two key variables (business model and business model canvas). All these analyses were performed using STATA software. The survey items included pre-existing and validated measures for entrepreneurial intention (Krueger et al., 2000), action (Shirokova et al., 2016), and skills (e.g., Gupta & Govindarajan, 2000). In addition, we asked respondents to assess their likelihood (on a 1 – 7

Likert scale) of Business Model and Business Canvas knowledge. Conducting surveys allowed us to triangulate key insights that emerged from the semi-structured interviews.

– – Insert Table 4.2 about here – –

4.4. Findings

4.4.1. Career preferences: taste for industry and taste for science

Early-career academics engaged in the pre-incubation program manifest distinct career preferences: (a) the *taste for industry* and (b) the *taste for science*. On the one hand, those with a *taste for industry* expressed a preference for commercializing their research outcomes, whether through spin-off creation, start-ups, patents, or industry collaborations. This preference is exemplified by the ongoing collaborative projects already underway with the industry sector. Realizing the novelty of their scientific research compared to existing solutions already available on the market, early-career academics with a taste for industry have considered commercializing the results of their research.

> *"My **career preference** is to be an **(academic) entrepreneur**. I expect to do just the canonical startup path." P13, CEO*

Furthermore, early-career academics with a taste for industry explicitly sought the support of the pre-incubation program to assess the feasibility of their business idea. While recognizing the significant commitments associated with creating academic spin-offs, they emphasize their desire to maintain affiliation with universities or research centers.

> *"The **spin-off** is a **business we want to start**. (However) my point of view is that we want to get someone to help us in the project (because) I am extremely interested in **staying primarily in academia**." P6, Operation Specialist*

This desire stems from the perception of academia as a safe anchor, a fallback option in case of entrepreneurial failure. Consequently, maintaining an academic position offers the possibility of working on entrepreneurial projects while minimizing the risk of failure.

> *"Over these years, I created a parachute for myself (i.e., **currently holding** a **postdoctoral position** at the **university**) that gives me peace of mind while thinking about entrepreneurial projects calmly (...). So, I have given myself a deadline by the end of the year, the first few months of the next year, to see if this **business idea***

*can have **solid legs to keep going**, **if it reaches potential investors** if it **reaches local government approval**." P5, CEO*

Some early-career academics bring the entrepreneurial experience gained in running family businesses and aspire to bring new and innovative ideas to life, following in their parent's footsteps. Their goal goes beyond personal success: they want to contribute to the economy by creating job opportunities and providing value to future employees and investors. These are the main driving forces behind their desire to become (academic) entrepreneurs.

*"Essentially, my idea is to **continue** my **path** within **entrepreneurship** because I want to continue my **parents' business**. My first goal is to **pursue** an (**academic**) **entrepreneurial career**, to try to do **well** for the **people** who are going to use the products that we produce and to do well on an entrepreneurial level so that we create a nice reality that is present in the marketplace and that gives satisfaction (...) also for the people who work within the company that is very important to me anyway." P10, CEO*

The second type of career preference by early-career academics participating in the pre-incubation program includes individuals with a *taste for science*. These individuals imagine their professional future within academia, where they prioritize the dissemination of their research results through scientific publications. Their motivation to participate in the pre-incubation program stems from their desire to complement the entrepreneurial team with their soft skills as consultants or specialists. Importantly, their primary aim is to advance scientific knowledge in their respective fields of study, emphasizing their dedication to research and teaching.

*"I certainly see my **career** as more **academically oriented**." P2, Technical Adviser*

These two career preferences among the members of the startup teams participating in the program provided valuable insights to understand their level of commitment to the activities provided by the pre-incubation program.

4.4.2. Hands-on learning through coaching and mentorship for developing the business idea

The pre-incubation program served as a catalyst of *hands-on learning for developing business ideas*, facilitated by mentorship and coaching support. Specifically, the entrepreneurship training course offered to early-career academics was structured in two

phases. In phase 1, participants were engaged in bootcamp days during which they received guidance and support from a team of three coaches. Notably, two of these coaches had extensive coaching experience spanning three or more years, while the third coach had less than three years of experience (see Table 4.3 for further details). In addition, the initial part of Phase 2 included eight days of online training with input from various experts in the fields of communication, finance, marketing, and law. These sessions complemented the theoretical lectures provided by the coaches. In total, there were 11 sessions with the coaches, and over 60 percent took place online.

– – Insert Table 4.3 about here – –

During Phase 1 of the training, early career academics participated in workshops focusing on the fundamentals of business models and value propositions. Participation of all team members was optional, so in some cases, only the project proponents attended the sessions. The training activities included practical exercises focusing on the business model and value proposition. Each of the three coaches took turns introducing the theoretical concepts and demonstrating their practical applications through real-life examples. Subsequently, the early career coaches within the teams were tasked with identifying problems and solutions, potential customer segments, value propositions and other aspects related to the project in about 10 minutes. During these exercises, coaches circulated among the teams, offering them guidance and support. After the presentation of the results of the exercises, the coaches provided structured feedback to help improve the feasibility of the projects. *Hands-on learning for the development of entrepreneurial ideas through coaching* support has emerged as the main mechanism through which early-career academics develop their entrepreneurial ideas in a refined manner. Individuals with a taste for industry or science actively engage in the Bootcamp sessions, recognizing them as valuable opportunities to discuss and advance their entrepreneurial concepts with coaches. In particular, the hands-on exercises were highly appreciated as they fostered deep reflection on the participants' business models, enabling them to identify and correct any shortcomings.

> *"The added value of the Start Cup is the opportunity to **iterate** with the **coaches** on your **business project** and reason about them, that is, to **receive support** from the **coaches** to develop the business that then allows you to iterate on the initial ideas and thus get a better one." P13, CEO*

*"The most important and most **useful lecture** for me was the **first day** (of the **Bootcamp**). Putting the value proposition and the business model on paper was helpful because, anyway, it is particularly important when you do something like this to put in black and white what you do and who you address. The problem is that for the business model part, we found who we are, what we do, who we address." P15, App Development*

In the second part of Phase 2, the twelve finalists received personalized one-to-one mentoring, carefully matched to the teams based on their experience in sectors or industries relevant to the entrepreneurial projects enrolled in the incubation program. In total, eleven mentors were chosen to provide personalized support to the teams (see Table 4.4 for further details).

– – Insert Table 4.4 about here – –

One-to-one mentorship meetings were not mandatory for all team members and were conducted remotely every week for over two months. Both mentors and teams enjoyed complete flexibility in scheduling meetings according to preferred days and times. Typically, these sessions included an update on the progress of writing key components of the business plan, such as problem-solving adaptation and market analysis, followed by a strategy on the next steps for the next meeting. The mentorship initiative was designed to help teams draft their business plans. Consequently, many participants highlighted the educational value of the process, emphasizing its role in promoting "new ways of thinking" through the practical application of the theoretical concepts imparted by the coaches.

*"**Writing** the **business plan** was an extremely **formative experience** because it forced us to produce a very complex document. Confronting myself with this necessity **broadened my knowledge** in the start-up field and the enterprise field. It formed me a lot and gave me **new ways of thinking**." P13, CTO*

*"The most **useful** part for me was the **one-on-one mentorship**, that is, when we were paired with a supportive expert and where we **put into practice** what the coaches taught in class." P12, Robot Planning*

Mentor support extended beyond the boundaries of business plan writing, prompting early-career academics to gain a wider range of insights. Rather than simply offering guidance in writing business plans, mentors encouraged people to introspectively address and overcome personal and group challenges on their own.

> *"It was great the **relationship** that there was with the **mentor** (...) he kept us thinking until we solved on our own. In my opinion, this is very important, both from the point of view of **personal growth** and the **team** in general." P1, CEO*

In summary, the *hands-on learning for developing the business idea* facilitated by mentorship support emerged as pivotal in enabling early-career academics to formulate their business plans, fostering autonomy in addressing both project-specific and personal challenges. Contrary to previous findings, our observations revealed that one-to-one mentorship was favored mainly by individuals with a taste for industry. Those with a taste for science showed less engagement during this phase and did not participate in any of the Phase 2 course activities offered by the pre-incubation program.

4.4.3. Proactive learning through external stakeholders for business idea validation

The pre-incubation program emerges as a catalyst of *proactive learning for idea validation*, involving iterative testing of entrepreneurial concepts through a trial-and-error approach with external stakeholders. In addition to one-to-one mentorship support in Phase 2, early-career academics engaged in a one-day training session with potential customers, partners, and local business associations in the Emilia-Romagna region. During these online sessions, the early-career academics presented their business ideas in the form of a 5-minute pitch per session - receiving valuable feedback on both the project and their presentation style. A maximum of three meetings were reserved for each entrepreneurial team, totaling 45 minutes per meeting. Moreover, they took the opportunity to forge new partnerships and conduct pilot tests within established companies. Therefore, proactive learning for idea validation with external stakeholders included collecting market data, consulting experts and, where possible, conducting pilot tests in established companies, all aimed at validating business ideas.

> *"The **feedback** on our idea came from the **industry**. We received validation of our idea, even from the various entrepreneurs we talked to through the Start Cup in the various discussion meetings." P12, Robot Planning*

*"I got confirmation of the hypothetical **validity of the project** (thanks to external stakeholders). Which still means a lot because it is no longer based on my hypothesis but still also on the opinion of a person who is rightly an expert." P3, CEO*

In addition to engagement with potential clients, partners and business associations, the pre-incubation program offered more networking opportunities with industry experts on the last day of the competition. This event brought together venture capitalists, business angels and serial entrepreneurs who, after a 5-minute pitch competition, actively participated in a question-and-answer session with novice academics, providing valuable feedback and insights. These components not only enriched the learning experience but also fostered meaningful connections and paved the way for valuable financial opportunities.

*"The opportunity to **get on stage** in front of a certain number of people, the opportunity to **speak** to many **external people** puts you in that difficulty, that thrilling feeling that you do not always get, and it will help you improve. Furthermore, that, of course, is **indirect teaching**." P1, CEO*

As in the previous case, *proactive learning for idea validation* is mainly driven by participants with a taste for industry, who demonstrate an unwavering dedication to activities involving continuous interaction with external stakeholders and industry experts. This commitment has allowed them a distinctive learning path for idea evaluation, steeped in practical insights from the real world. The feedback mechanisms employed not only boosted the confidence (or identified areas for improvement) of early-career academics in starting new ventures but also equipped them with valuable tools and guidance to effectively reach target customers.

4.4.4. Impact of the pre-incubation program on the development of entrepreneurial competencies

The results revealed that most of the early-career academics enrolled in the pre-incubation program have a background in scientific disciplines, such as physics, automotive engineering, and mechanical engineering, often holding a master's or PhD degree (see Table 4.5). While possessing a deep technical understanding of their business idea, a gap emerged in their entrepreneurial skills, particularly regarding the commercialization of academic research. This observation is in line with the existing scientific literature, which emphasizes that

individuals with a scientific background often lack the necessary skills for the creation of new businesses - a gap that early-career academics tried to fill through participation in pre-incubation programs. According to the results of our empirical research, participants with a taste for industry reported that they significantly improved their entrepreneurial skills after their engagement in pre-incubation. These skills encompass a broad spectrum, ranging from procedural skills like accounting and finance knowledge to managerial skills like problem-solving and team management, and communication skills. In this sense, the program has played a key role in training individuals with the versatility to navigate the intricate landscapes of entrepreneurship and academic research. Unfortunately, we cannot draw the same conclusions for early-career academics with a taste for science, as they declined to respond to the second round of surveys and interviews.

> *"What I learned the most from the course was the business plan, especially the **financial part**." P1, CMO*

> *"If I had to find the main skill that Start Cup gave me, it was that of **communicating** with someone who is not technical. As a technician, communicating with other non-technical people is very complicated." P10, CEO*

> *"On the **management skills** side, the program helped team management, and everything related to project management." P1, CMO*

One of the most interesting transformations found among the participants was the development of an entrepreneurial mindset. This evolution was marked by their ability to recognize and capitalize on entrepreneurial opportunities, along with their ability to articulate a sharp vision of their desired future ventures. However, as in the past, we are unable to draw the same conclusions for early career academics with a preference for science, as they chose not to participate in the second round of surveys and interviews.

> *"The **entrepreneurial mindset** is something that the program leaves you with and that maybe in the future could come in handy even within a company itself for anyone." P2, CEO*

The nurturing of entrepreneurial competencies was accomplished through a combination of theoretical and practical activities facilitated by the pre-incubation programs. The application of these acquired competencies significantly influenced the formulation and

structure of the final business plan documents, highlighting the tangible impact of the pre-incubation program in equipping participants with the tools and knowledge necessary to translate their innovative ideas into viable business ventures. These empirical results validate the training effectiveness of the pre-incubation program in fostering the entrepreneurial skills of scientists, aligning with, and contributing to the existing body of research articulated by scholars such as Roberts and Fusfeld (1981) and Gupta and Govindarajan (2000). In addition, participants concluded that the program provided a replicable "method" for future business ideas, encompassing various aspects of the entrepreneurial process, ranging from the inception of the business idea to the acquisition of necessary information and beyond. It not only solidifies their understanding but also enhances their knowledge for navigating the entrepreneurial journey.

> *"I think I **learned** some soft skills, very cross-cutting for the start-up. So, **what is the startup about, from the initial part to go-to-market in general.** The mindset that the **program** imparts to you is not only to bring the startup to life but to give you **training and teach you a method** that you can then replicate in future startups that you want to launch." P1, CEO*

4.4.5. Pivoting of career preference

One of the most exciting findings from our empirical study concerns how participation in pre-incubation affects the pivoting of career preferences among early-career academics with a taste for industry after participation in the program. Engagement in pre-incubation activities serves as a crucible for assessing the feasibility of an entrepreneurial (academic) career. For some individuals with a taste for industry, their career preference was confirmed by the completion of the program:

> *"Absolutely, yes, I **confirm** I want to see my **career** in **(academic) entrepreneurship**. At the moment, yes, this has been my decision." - P13, CTO*

> *"I would still **like** to **pursue** an **(academic) entrepreneurial career**. Perhaps not initially as a full-fledged enterprise, but to have my independence, and who knows what may come later. It is a challenge that has always attracted me." P15, App Development*

For other early-career academics with a taste for industry, their career preference was disconfirmed at the end of the program:

> *"**After participating** in the **program**, I concluded that **I am not well-suited** for a **career** in **(academic) entrepreneurship**." P2, CTO*

As for early-career academics with a taste for industry, but who later turn towards a taste for science, this tendency is particularly pronounced in those conducting research in the hospital sector. The weight of the responsibilities inherent in the entrepreneurial and academic role within the hospital proved significant enough to lead to a reassessment of work-life balance priorities. Consequently, there has been a reassessment of their involvement in research activities, with a shift towards prioritizing the patenting of research results over commercialization efforts.

> *"I think my **career preference** has **changed**. I see my career **today** in the **(academic) hospital** rather than as an (academic) entrepreneur. I am super glad I had this experience. I realized that **it is impossible** to be a **hybrid** of **an academic** and an **entrepreneur**. I am super glad I had this experience. I realize **it is not feasible** for me **to pursu**e an **(academic) entrepreneurial career**, so **without the program**, I would have **never known**." P14, CEO*

On the other hand, there are early-career academics with an initial taste for industry who have undergone a pivot in career preferences towards established organizations. This transformation is particularly evident among individuals who have recently obtained a master's degree. Participation in the incubation program has broadened their horizons, exposing them to many career opportunities outside academia, especially in innovation-focused fields.

> *"My **career preference** has **changed** since last year when I wanted to be a nomadic (academic) digital entrepreneur. I realize I want to work in innovation within accelerators and incubators as a consultant. Indeed, I started working about one month ago at the Technopole of Reggio-Emilia in the "startup acceleration program." So, **I am currently there**, and my **vision** in the **medium to short term** is to **remain there**." P1, CMO*

*"My **career preference** has **changed**. Now I am employed in something else. I do component distribution strategies in Maserati in Modena. However, **my dream** is to **work** in the **innovation sector for automotive**." P1, CEO*

Several key factors have been identified as contributing to the pivoting in career preferences for those with a taste for industry. First, engagements with external stakeholders provided opportunities to interact with potential customers, partners, and industry representatives, potentially revealing practical applications of their research for commercialization. Second, the lectures on finance, customer dynamics, market analysis and legal aspects, among others, enabled early-career academics to gain a deeper understanding of the challenges and skills required for entrepreneurial success. Third, networking events with industry experts had an equally strong impact. These sessions provided scientists with direct feedback and advice from experienced professionals, encouraging them to think more deeply about the feasibility of their ideas and prompting them to reconsider their career direction based on the level of commitment required for their activities. In summary, pre-incubation activities involving hands-on experience, engagement with the external ecosystem and training on concrete aspects of entrepreneurship appear to have played a crucial role in inducing early-career academics to re-evaluate their career preferences. The program acted as a catalyst for changing career preferences, instilling greater clarity and realism in the career trajectories of incubated individuals. This phenomenon underlines the profound influence of entrepreneurship education in shaping viable career paths in the ever-changing landscape of entrepreneurship.

– – Insert Figure 4.1 about here – –

4.4.6. Survey Results

Our discoveries indicate that the practical activities within the pre-incubation program proved beneficial in cultivating new entrepreneurial skills among participants and in prompting reflection about their career preferences. We investigated these dynamics by asking program participants to assess their level of knowledge (pre- and post-program) in technical, procedural, and managerial skills. This evaluation was supplemented by inquiring about the entrepreneurial actions they engaged in, as well as their understanding of business models and the business model canvas. Finally, we delved into whether there were any alterations in their entrepreneurial intentions. The insights derived from the survey results can be summarized as follows. Initially, we noted an increase in the perceived acquisition of technical skills [(pre-

survey: mean=-0.18; SD=1) compared to post-survey (mean=0.18; SD=1)]; procedural skills [(pre-survey: mean=-0.15; SD=1) compared to post-survey (mean=0.15; SD=0.99)]; and managerial skills [(pre-survey: mean=-0.03; SD=0.97) compared to post-survey (mean=0.29; SD=1)] by the program participants. However, it is essential to note that the t-test results did not reveal statistically significant differences. Furthermore, we noted an increase in entrepreneurial action (pre-survey: mean = -0.03; SD=1) compared to post-survey (mean=0.03; SD=0.93) and entrepreneurial intention (pre-survey: mean = 4.58; SD=1.92) compared to post-survey (mean=4.96; SD=1.90). However, like the skills assessment, these t-test results did not uncover statistically significant differences. Then, we evaluated whether participants demonstrated an enhancement in their understanding of business models and the business model canvas. Echoing our interviews, we found that the difference between pre- and post-program knowledge of business models and the business model canvas was statistically significant at the 5% level.

– – Insert Table 4.5 about here – –

4.5. Discussion

4.5.1. Theoretical contributions

With this study, we aim to improve our understanding of the effectiveness of pre-incubation programs by exploring whether career preferences among early-career academics drive their entrepreneurial learning in pre-incubation programs. Our core argument is that different career preferences may explain the mechanisms through which individuals learn in pre-incubation programs and the resulting outcomes. Our study contributes to the literature on entrepreneurial learning in pre-incubation programs (Williams Middleton & Donnellon, 2014; Redondo & Camarero, 2017; Ting et al., 2017; Wolf, 2017) in several ways.

First, although there is extensive research on the outcomes of entrepreneurial education and training by pre-incubation programs (e.g., Souitaris et al., 2007; Oosterbeek et al., 2010; (Elert et al., 2015) little has been done to better explain the learning mechanisms that occur in these contexts (Metcalf et al., 2021). Since most pre-incubation programs target graduates or scientists who are in the early stages of their career decisions (Lyons & Zhang, 2018), we do not know how these preferences may drive entrepreneurial learning and outcomes at the individual level of analysis. In our study, individual antecedents are represented by distinct career preferences. Individuals with a *taste for industry* express a desire to commercialize the

results of their research, through the creation of spin-offs, start-ups, patents, or industrial collaborations. Conversely, individuals with a *taste for science* imagine their professional future within academia, prioritizing the dissemination of their research results through scientific publications.

Our findings suggest that these individual antecedents play a significant role in shaping different motivations for participation in pre-incubation programs. For those with a taste for science, their motivation stems from a desire to complement entrepreneurial teams with their soft skills as consultants or specialists. On the other hand, individuals with a taste for industry seek the support of pre-incubation programs to assess the feasibility of their business ideas. These antecedents are crucial to generate initial enthusiasm to participate in program activities. Through activities such as mentorship and coaching, these antecedents are expressed, guiding the learning that takes place within the pre-incubator. Hands-on learning for the development of entrepreneurial ideas through coaching support has emerged as the main mechanism through which early-career academics refine and improve their entrepreneurial knowledge. Individuals with both a taste for industry and science actively participate in bootcamp sessions, recognizing them as valuable opportunities to discuss and advance their entrepreneurial ideas with coaches. In particular, hands-on exercises are highly valued because they encourage deep reflection on participants' business models, enabling them to identify and correct any shortcomings. Furthermore, hands-on learning for developing business ideas through mentor support proved to be crucial in enabling early-career academics to formulate their business plans, also fostering autonomy in dealing with project-specific and personal challenges. Our findings suggest that one-to-one mentorship was favored mainly by individuals with a taste for industry. Furthermore, these antecedents drive learning within the pre-incubation program through activities such as pilot testing within established companies, market data collection and expert advice aimed at validating business ideas. Participants with a taste for industry demonstrate that they engage in activities that involve continuous interaction with external stakeholders and industry experts. Consequently, the feedback mechanisms employed in these activities increase their confidence in the creation of new businesses, identify areas for improvement and provide them with tools and guidance to effectively reach their target customers.

In doing so, we also shed light on the effect of pre-incubation programs on the development of entrepreneurial competences and the pivoting of career preferences. We found that individuals with a taste for industry significantly acquired entrepreneurial competencies after participating in pre-incubation, including knowledge on accounting, finance, and

management. In addition, they developed an entrepreneurial mindset that enabled them to recognize and capitalize on entrepreneurial opportunities. Furthermore, our study suggests that in some cases, participation in the pre-incubation program influences the change in career preferences among early-career academics with a taste for industry. Some of them shifted their preferences towards working in established organizations. This transformation is driven by three factors within the pre-incubation program: meetings with external stakeholders, lectures, and networking events with industry experts. Collectively, these activities provided individuals with the opportunity to interact with potential customers and industry representatives, enhancing their understanding of the challenges and skills required for entrepreneurial success. This, in turn, led them to reconsider the direction of their careers based on the level of commitment required for their entrepreneurial ventures.

4.6. Conclusions

4.6.1. Managerial implications

Our findings have implications for managers of pre-incubation programs. They suggest recognizing the diversity of participants' career preferences. First, when selecting participants for pre-incubation program, managers should consider their motivational profile to ensure that it is in line with the program's objectives. This consideration can help ensure that participants are fully committed to taking advantage of the opportunities offered by the program. This understanding should guide the design of flexible entrepreneurship education and training activities to meet the specific needs and goals of individuals. By providing targeted support, managers can improve the effectiveness of pre-incubation programs and increase the likelihood of successful new venture creation among participants. Furthermore, since exposure to certain training content can pivot individuals' career preferences, managers should incorporate sessions with external stakeholders, such as potential consumers, investors, and industry experts, into the program curriculum. These sessions can provide participants with valuable insights into market needs and trends, helping them to make informed decisions about their future career path.

4.6.2. Policy implications

Finally, our study has policy implications. Although our results emphasize the importance of career pivoting in pre-incubation programs, they do not suggest that all individuals with a taste for industry have the same experience. From a policy perspective,

universities and governments investing in the commercialization of scientific research should facilitate networking opportunities with professionals and access to (financial) resources to explore and promote (academic) entrepreneurship as a viable career path, especially for those with a taste for industry. By facilitating career transitions - towards academic entrepreneurship – the pre-incubation program can empower participants to make informed decisions about their future careers involving local economic development and growth.

4.6.3. Limitations

This study has some limitations. First, data were collected in a pre-incubation program in Italy. Future research should therefore extend the data collection to other contexts to generalize the results of the study. Second, as participation in the project was voluntary, the study sample was relatively small. Therefore, we encourage future research to extend the study with a larger sample size. Such efforts would contribute to a more comprehensive understanding of entrepreneurial learning mechanisms in pre-incubation programs.

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4.8. Tables

Table 4.1 - Overview of projects participating in the pre-incubation program.

Project	Typology[7]	Sector	Project member	Data collected	Project description	Training received
(P1) 3DFlix	University spin-off	ICT	4	Interview; field observation; pitch deck; survey	Brokerage platform between users who need to print a 3D object and printers located in the territory.	Phase 1, Phase 2
(P2) AMARAD	University spin-off	ICT	3	Interview; field observation; pitch deck; survey	Millimeter-wave radar sensors for intelligent systems that can be used in biomedical and industrial sectors.	Phase 1, Phase 2
(P3) Capsula alimentare	University spin-off	Life science	1	Interview; field observation; pitch deck; survey	A food gelatin capsule that packs meal-equivalent nutrients inside as an alternative treatment for dysphagia patients.	Phase 1
(P4) Folia	Start-up	Industrial	3	Field observation; pitch deck; survey	Silverskin is a source of cellulose for packaging and textiles.	Phase 1
(P5) H2Energy	Start-up	CleanTech&Energy	2	Interview; field observation; pitch deck; survey	Development and implementation of hydrogen-based solutions and facilities for ecological transition.	Phase 1, Phase 2
(P6) HIDRA	University spin-off	Life science	4	Interview; field observation; pitch deck; survey	Digital platform to facilitate and accelerate the identification of new drug targets and biomedical needs.	Phase 1, Phase 2
(P7) Lavoroo	Start-up	ICT	1	Field observation; pitch deck; survey	A digital social platform that concentrates demand and supply of occasional work in an alternative and innovative way.	Phase 1
(P8) maTERia	University spin-off	CleanTech&Energy	3	Field observation; pitch deck; survey	Meta-window revolutionizing acoustics through multiphysical metamaterials.	Phase 1, Phase 2

[7] All the entrepreneurial projects that participated in the Start Cup Emilia-Romagna competition originate from academic research, encompassing both university spin-offs and innovative startups. The universities involved in the competition are in the Emilia-Romagna Region, specifically in Bologna, Ferrara, Modena, Reggio-Emilia, and Parma.

(P9) Merendina Desirè	Start-up	Industrial	2	Field observation; pitch deck	An eco-innovative snack that is friendly to the environment and healthy.	Phase 1
(P10) LPTech	Start-up	Life science	4	Interview; field observation; pitch deck; survey	Implementation of patient-specific cranioplasties with innovative technology.	Phase 1, Phase 2
(P11) PuffIDO	Start-up	Life science	1	Field observation; pitch deck; survey	Environmentally friendly universal inhaler.	Phase 1, Phase 2
(P12) Robosect	University spin-off	Industrial	4	Interview; field observation; pitch deck; survey	Automatic switchboard testing service to specialized companies.	Phase 1, Phase 2
(P13) Robotizr	Start-up	Industrial	2	Interview; field observation; pitch deck; survey	Web app with a no-code interface that replaces old programming languages.	Phase 1, Phase 2
(P14) SARA	University spin-off	Life science	5	Interview; field observation; pitch deck; survey	Software with an intuitive graphical interface for diagnosis of benign and malignant cancers of the uterus.	Phase 1, Phase 2
(P15) StartFounders	Start-up	ICT	3	Interview; field observation; pitch deck; survey	Digital platform for innovative idea sharing and entrepreneurial team building.	Phase 1
(P16) To the mun[8]	Start-up	CleanTech&Energy	1	Pitch deck	Innovative solution for sustainable fashion trend between reuse and consumer awareness of contemporary issues.	Phase 1
(P17) VeryItaly	Start-up	ICT	2	Field observation; pitch deck; survey	Service for companies that enables greater protection of their products in an international and highly competitive market.	Phase 1
(P18) ZoTech	University spin-off	Industrial	5	Field observation; pitch deck; survey	Digital, modular, multi-channel systems for monitoring and predictive diagnostics of industrial machinery and civil structures/infrastructure.	Phase 1, Phase 2

[8] Due to COVID-19, the founder of the "To the Mun" project had to adapt and attend the Bootcamp training remotely. Consequently, no on-site field observation of this project was conducted during the in-person Bootcamp training.

Table 4.2 - Data sources and use.

Data source	Type of data	Use in the analysis
Archival data (565 pages single-spaced)	*Project-related documents:* meeting minutes, PowerPoint presentations by coaches and organizers.	Familiarize with the program context; support the reconstruction of the business plan competition, and triangulate evidence from field observations and interviews.
Observations (80 pages double-spaced)	*Informal conversations:* informal talk with participants, program designers, coaches, and mentors during the meeting and lunch breaks.	Triangulate interpretations emerging from the interviews.
	Pictures: visual documentation of the team members during working groups.	Keep a record of the team dynamics.
	Field notes from training attendance: a detailed record of people present or absent at lectures, of the type of content and methodologies used by coaches, and of interactions between coaches/mentors and participants.	Produce an initial understanding of the teaching and learning dynamics.
Interviews (92 pages single-spaced; 509 minutes)	*First-stage interviews:* (n=20) with participants to investigate their competencies, motivations, and expectations from the program, along with career preferences before entering the competition.	Familiarize with the program participants.
(47 pages single-spaced; 225 minutes)	*Second-stage interviews:* (n=11) with participants to keep track of the evolution of their business idea, and team dynamics, as well as investigate the change in competencies and career preferences, among others.	Investigate the cognitive processes enacted by different individuals during different training exposures.
Survey (n=31)	*Preliminary and follow-up surveys* (n=31) with participants to track differences in their entrepreneurial knowledge, skills, actions and intentions, among others.	Corroborate the results that emerged from the analysis of the interviews.

Table 4.3 - Overview of the coaches and their experiences.

Experience	Coaching training[9]	Coaching experience[10]	Project coached
(C1) Manager in Deloitte (6 years); venture capital (1 year); startupper (4year)	No	Senior	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18
(C2) Manager in Deloitte (5 years)	No	Senior	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18
(C3) Innovation and strategy analyst in Deloitte (1year); junior investment analyst (1year)	Yes	Junior	P1, P2, P3, P4, P5, P6, P7, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18

Table 4.4 - Overview of the mentors and their experiences.

Field of experience	Mentoring experience[11]	Project mentored
(M1) Financial advisor	Senior	P13
(M2) Product & IT	Senior	P1
(M3) Financial advisor	Senior	P10
(M4) Strategy & Innovation	Senior	P12
(M5) Strategy & Innovation	Junior	P6
(M6) Strategy & Innovation	Junior	P14
(M7) Insurance advisor	Senior	P2, P8
(M8) Strategy & Innovation	Junior	P18
(M9) Strategy & Innovation	Senior	P5
(M10) Healthcare strategy & innovation	Junior	P11

[9] Coaching training refers to the coach's being trained on how to design entrepreneurship education and training programs.

[10] Coaches with 0 to 3 years of experience are categorized as having senior experience, while those with 3 years and more are classified as senior coaches.

[11] Mentors with 0 to 3 years of experience are categorized as having senior experience, while those with 3 years and more are classified as senior mentors.

4.7.1. Robustness Check

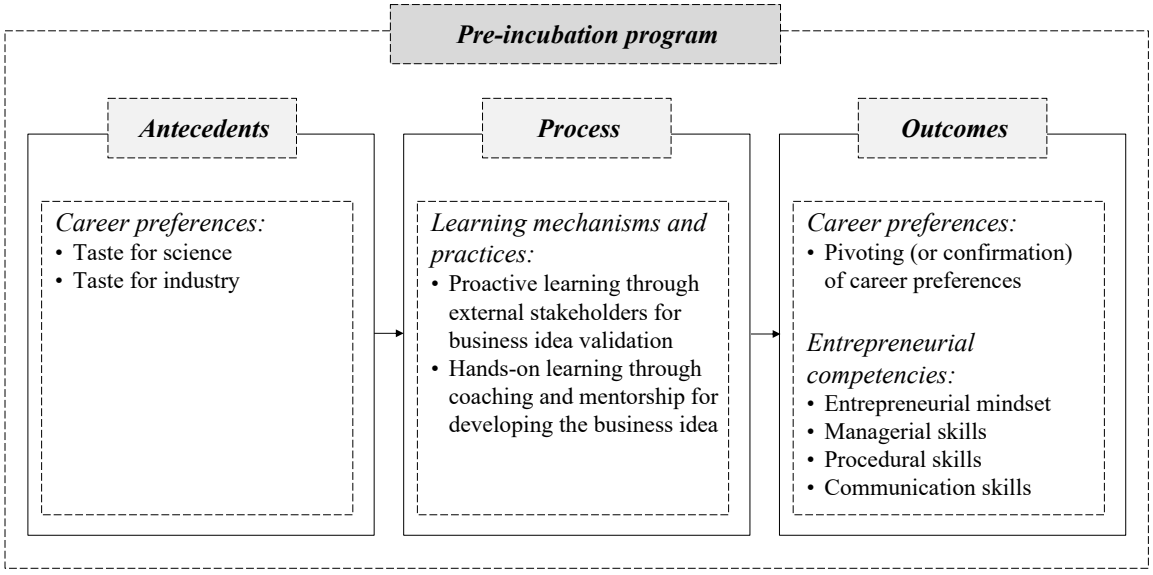
Table 4.5 - T-test pre and post, Entrepreneurial: Knowledge, Skills, Intention and Action.

Variable	Group	Obs	Mean	Std. dev.	[95% Conf. Interval]		P value
Business Model Canvas	0	31	3.54	2.12	2.76	4.32	0.05**
	1	31	4.51	1.56	3.94	5.09	
Business Model	0	31	3.19	1.77	2.54	3.84	0.05**
	1	31	4.06	1.65	3.45	4.67	
Technical skills*	0	31	-0.18	1	-0.54	0.16	0.14
	1	31	0.18	1	-0.18	0.55	
Procedural skills*	0	31	-0.15	1	-0.51	0.21	0.24
	1	31	0.15	0.99	-0.21	0.51	
Managerial skills*	0	31	-0.03	0.97	-0.38	0.32	0.82
	1	31	0.29	1	-0.35	0.40	
Entrepreneurial intention	0	31	4.58	1.92	3.87	5.28	0.42
	1	31	4.96	1.90	4.26	5.66	
Entrepreneurial action*	0	31	-0.03	1	-0.42	0.36	0.80
	1	31	0.03	0.93	-0.31	0.37	

Notes: **p<0.05. Factors with an asterisk are normally distributed.

4.9. Figures

Figure 4.1 – Antecedents and outcomes of the learning mechanisms and practices in the pre-incubation program.



4.10. Exhibits

Figure E4.1 - Qualitative coding schema.

Table E4.1 - Detail of measure: Business Model Canvas and Business Model.

Business Model Canvas	***Business Model***
What is your level of knowledge of the Business Model Canvas on a scale of 1 (null) to 7 (high)?	What is your level of knowledge of the Business Model on a scale of 1 (null) to 7 (high)?

Table E4.2 - Detail of measure: Technical Skills, Procedural Skills, Managerial Skills.

Latent variable	**Scale format**	**Item**	**Item loading (t=0)**	**Item loading (t=1)**	**Research Reference**
Technical Skills	1 to 7 scale	Please indicate to date your level of competence in the following areas on a scale of 1 (not at all competent) to 7 (very competent):			Gupta & Govindarajan, 2000
		(1) Product design	.87	0.87	
		(2) Project design	.81	0.81	
		(3) Production system	.87	0.87	
CR			**.90**	**.90**	
Procedural Skills	1 to 7scale	Please indicate to date your level of competence in the following areas on a scale of 1 (not at all competent) to 7 (very competent):			Gupta & Govindarajan, 2000
		(1) Accounting	.91	.92	
		(2) Marketing	.90	.91	
		(3) Purchasing and sales	.89	.89	
		(4) Logistic and distribution	.91	.92	
		(5) Finance	.91	.92	
CR			**.92**	**.93**	
Managerial skills	1 to 7scale	We ask you to express how much you agree or disagree with the following statements on a scale of 1 (strongly disagree) to 7 (strongly agree):			(Roberts & Fusfeld, 1981)
		(1) I am good at problem-solving	.79	.86	
		(2) I am good at communicating my point of view and supporting new ideas	.82	.83	
		(3) I am good at motivating people and learning teams	.78	.82	
		(4) I am good at maintaining interpersonal relationships and coordinating people	.82	.87	
		(5) I am good at developing resources and creating new	.78	.84	

	competencies within the organization		
CR		**.83**	**.87**

Table E4.3 - Detail of measure: Entrepreneurial Action.

Entrepreneurial Action (10 items adapted from Shirokova et al., 2016)	
Entrepreneurial Action (t=0)	*Entrepreneurial Action (t=1)*
Please answer no or yes i**f, before applying to the Start Cup 2022**, you take any of the following actions to establish a new company: (1) Discussed product or business idea with potential customers (2) Collected information about markets or competitors (3) Written a business plan (4) Started product/service development (5) Started marketing or promotion efforts (6) Purchased material, equipment, or machinery for the business (7) Attempted to obtain external funding (8) Applied for a patent, copyright, or trademark (9) Registered the company (10) Sold product or service	Please answer with no or yes if you have **recently** taken any of the following actions to establish a newcompany: (1) Discussed product or business idea with potential customers (2) Collected information about markets or competitors (3) Written a business plan (4) Started product/service development (5) Started marketing or promotion efforts (6) Purchased material, equipment, or machinery for the business (7) Attempted to obtain external funding (8) Applied for a patent, copyright, or trademark (9) Registered the company (10) Sold product or service
CR .65	**CR .64**

Table E4.4 - Detail of measure: Entrepreneurial Intention.

Entrepreneurial intention 5Y (1 item adapted from Krueger et al., 2000)		
Entrepreneurial Intention 5Y	1 to 7 scale	Please indicate what is the probabilitythat you will start your own business in the next five years from 1 (not probable at all) to 7 (very probable)

Note: items have changed from the original scales. Entrepreneurial intention 5Y originally was “Estimate the probability you’ll start your own business in the next five years?” on a scale from 1=Up to 100% or better to 8= down to 25% or bette

Appendix

A1. Interview protocol for participants: first round interview

Introduction to the interview:
This project studies aspiring entrepreneurs in Italy with a focus on the Emilia-Romagna region. One of the ways the region can stimulate the birth and growth of new businesses is through pre-incubation programs such as the Start Cup 2022 promoted by ARTER. If that is okay with you, I would ask you to start exploring some issues related to the entrepreneurial project you candidate at the Start Cup.
[consent to registration]

1. Tell me about your entrepreneurial project [project name]: where did the idea come from, and by whom?
2. I would like you to tell me about the journey that led you towards an entrepreneurial career.
3. I noticed in the survey that you have (have not) taken courses on entrepreneurship and business creation during your academic path. Do you think this has been helpful (vs. not helpful) for launching your career in entrepreneurship? If yes, why?
4. Tell me about the team members and their skills. Do you believe that new skills are needed for the development of the business idea? If yes, how, and when do you plan to introduce them?
5. What motivated you to apply for participation in the Start Cup 2022 program?
6. What are your expectations from the training sessions?
7. Have you previously participated in other pre-incubation programs sponsored by the university or other public or private entities?
8. If you were to think about obstacles to overcome... does any, come to mind?
9. Where do you see yourself in 5 years?

A2. Interview protocol for participants: second round interview

[consent to registration]

1. Can you update me on the current development stage of the entrepreneurial project that participated in the Start Cup 2022 edition?
2. Has the team remained unchanged, or have there been new team members? In the latter case, what type of resources and skills have you integrated, and why?
3. Your expectations/motivations at the beginning of the Start Cup 2022 program were [...]. Today, do you feel they have been met or not? In what way and why?
4. Compared to the idea you had before starting the Start Cup 2022 program, what kind of professional career are you currently inclined toward?
5. How likely do you think it is that you will start a startup within the next year?

6. Could you provide a general comment on what you believe you have learned from the training sessions in terms of new skills and/or entrepreneurial competencies for the development of your project?
7. Which activities or exercises conducted during the entrepreneurial education program seemed most useful in terms of developing the business model for your project?
8. How did the structure of the courses (practical/theoretical) and the approach of the coaches/mentors contribute to this?
9. Do you have any suggestions on how to improve the educational program for the next edition?
10. Are there any topics we have not discussed that you would like to explore?

A3. Interview protocol for coaches: pre-incubation program

(1) Personal information

- Name:
- Last name:
- Date and place of birth:
- E-mail:

1. What is your highest level of education?
   - PhD
   - Master's degree
   - Bachelor's degree
   - High-school diploma
   - Other
2. At which institution did you obtain the degree?

(2) Occupation and previous work experiences

1. Currently, are you employed?
   - At which company?
   - In which industry?
   - What is your role within the organization?
2. How many years of experience do you have in the same industry?
3. Do you have any previous work experience? If yes, what are they?

(3) Participation in training to design entrepreneurial training courses

1. Have you ever participated in training courses for coaches on how to design entrepreneurship training courses?
2. What of the following approach/methodology do you use in designing training courses?
   - Group work activities (e.g., business simulation game)
   - Testimonials from successful entrepreneurs
   - Pitch sessions
   - Business challenge

- Other

3. How did you plan the structure of the Bootcamp phase?

(3) Measurement of expectations and success of the training program

1. What expectations do you have regarding the Start Cup 2022 participants at the end of the entire program?
2. How do you measure the success of your training program?
3. On a scale from 1 (none) to 7 (high), how important do you consider the following outcomes of your training program:
    - Number of participants
    - Number of companies founded by participants
    - Satisfaction of participants
    - Advancement or improvement of entrepreneurial skills/knowledge of participants
    - Startups receiving funding
    - Startups having a viable business model
    - Startups have unique ideas
    - Execution of their ideas with the strength of teamwork
    - Other

(4) Personal evaluation criteria on entrepreneur, entrepreneurial idea, and startup failure

1. When you need to assess a future entrepreneur, what do you consider most important and least important?
2. On a scale from 1 (none) to 7 (high), how important do you consider the following elements in the evaluation process of an emerging entrepreneur:
    - Age
    - Education
    - Entrepreneurial skills/abilities/knowledge
    - Other
3. When evaluating an entrepreneurial idea, what do you consider more or less critical among:
    - Team composition
    - Growth potential
    - Technical feasibility of the business idea
    - Innovativeness
    - Social value
4. From your perspective, what are the reasons why an emerging entrepreneurial project might fail?
    - Leadership failure
    - Lack of uniqueness and value in the entrepreneurial idea
    - Not in line with customer needs
    - Unprofitable business model
    - Poor financial management
    - Other

5. Is there any issue or idea that you would like to highlight or that we did not discuss in the interview?

B1. Survey for participants: pre-incubation program

Section 1. Personal information

A1. Name:
A2. Last name:
A3. Place of birth:
A4. day/month/year:
A5. E-mail:
A6. Project name:
A7. Do you have an assigned patent? Any kind, e.g., USPTO, EPO, ITPTO, WIPO:

1. Yes
2. No

A8. Have you ever started a company? (Source: Nicolaou, 2008)

1. Yes
2. No

Section B. Entrepreneurial skills

B1. Please indicate to date your level of competence in the following areas on a scale of 1 (not at all competent) to 7 (very competent):

	1	2	3	4	5	6	7
01. Product design							
02. Process design							
03. Production system							
04. Accounting							
05. Marketing							
06. Marketing and sales							
07. Logistics and distribution							
08. Finance							

(Source: Gupta & Govindarajan, 2000)

B2. We ask you to express how much you agree or disagree with the following statements on a scale of 1 (strongly disagree) to 7 (strongly agree):

	1	2	3	4	5	6	7
01. I am good at problem-solving							
02. I am good at communicating my point of view and supporting new ideas							
03. I am good at motivating people and learning teams							

04. I'm good at maintaining interpersonal relationships and coordinating people							
05. I am good at developing resources and creating new competencies within the organization							

(Source: Roberts & Fusfeld, 1981)

B3. Please answer Yes/No if, before applying to the Start Cup 2022, did you take any of the following actions to establish a new company:

	Yes	No
01. Discussed product or business idea with potential customers		
02. Collected information about markets or competitors		
03. Written a business plan		
04. Started product/service development		
05. Started marketing or promotion efforts		
06. Purchased material, equipment, or machinery for the business		
07. Attempted to obtain external funding		
08. Applied for a patent, copyright, or trademark		
09. Registered the company		
10. Sold product or service		

(Source: Shirokova et al., 2016)

Section 3 – Academic and entrepreneurial background

C1. Please indicate your highest level of education

1. PhD
2. Master's degree
3. Bachelor's degree
4. High-school diploma
5. Other

C2. At which institution did you obtain the degree?

C3. To date, please indicate with Yes or No if:

1. You are an entrepreneur with employees
2. You are an entrepreneur without employees (with a VAT number)
3. You are employed at a Research Center
4. You are employed at the university
5. You are a student
6. You are unemployed or seeking employment
7. Other [ ]"

[If C3 = 03 OR if C3=04]

C3.1 Please indicate the name of the University or Research Center:

[To All]

C4. During your primary or secondary school career, did you attend a course on entrepreneurship and business creation?

1. Yes
2. No

[If C1 = 02 OR if C1 = 03]

C5. During your university career, did you attend a course on entrepreneurship and business creation?"

1. Yes
2. No

[If C1 = 01]

C6. During your doctoral studies, did you attend a course on entrepreneurship and business creation?

1. Yes
2. No

[If C4 ≠ 02 OR if C5 ≠ 02 OR if C6 ≠ 02]

C6.1 Please indicate with Yes/No if the course on entrepreneurship and business creation included any of the following activities. You can choose more than one:

	Yes	No
01. Group work activities (e.g., writing a Business Plan or a Business Simulation Game)		
02. Receiving feedback from teachers and/or mentors and coaches		
03. Testimonials from real experiences by established entrepreneurs		
04. Pitch sessions		
05. Business challenge		

C7. Please answer with Yes/No to the following questions:

	Yes	No
01. Do you have a parent who currently owns or has owned a business in the past?		
02. Does a family member (other than a parent) currently own or has owned a business in the past?		
03. Have you ever worked in a family member's business?		

(Source: Carr et al., 2007)

Section 4 – Startup glossary

D1. What is your level of knowledge of the Business Model Canvas on a scale from 1 (none) to 7 (high)?

1 (none)	2	3	4	5	6	7 (high)

D2. What is your level of knowledge of the Business Model in the field of entrepreneurship, from 1 (none) to 7 (high)?

1 (none)	2	3	4	5	6	7 (high)

D3. Of the following items, identify those INCLUDED/EXCLUDED from the Business Model Canvas and write the corresponding number in the correct box:

1. Bootstrapping
2. Crowdfunding
3. Value proposition
4. IPO
5. Revenue streams
6. Elevator pitch
7. Customer segment

D4. The business model in innovative entrepreneurship is scalable when:

1. Revenues grow more than proportionally to costs
2. Costs grow more than proportionally to revenues
3. Break-even point is reached
4. None of the above

Section 5 – Entrepreneurial Intention

E1. How likely are you to start a business in the next five years on a scale from 1 (unlikely) to 7 (very likely)?

1 (unlikely)	2	3	4	5	6	7 (very likely)

(Source: Krueger et al, 2000)

B2. Survey for participants: post-incubation program

Sezione 1. Anagrafica

A1_01 Name:

A1_02 Last name:

A1_03 Project name:

A2_02. Have you participated as part of a team in the training courses of the Start Cup 2022 Bootcamps?

1. Yes
2. No

A2_02 Have you participated as part of a team in the training courses of Phase 2 of the Start Cup 2022?

1. Yes
2. No

Section 2. Entrepreneurial skills

B1. Please indicate today, on a scale from 1 (not competent at all) to 7 (very competent), your level of competence in the Technical Skills defined by:

	1	2	3	4	5	6	7
01. Production design							
02. Process design							
03. Production system							

(Source: Gupta & Govindarajan, 2000)

B2. Please indicate today, on a scale from 1 (not competent at all) to 7 (very competent), your level of competence in the Procedural Skills defined by:

	1	2	3	4	5	6	7
01. Accounting							
02. Marketing							
03. Marketing and sales							
04. Logistics and distribution							
05. Finance							

(Source: Gupta & Govindarajan, 2000)

B3. Please indicate today, on a scale from 1 (not competent at all) to 7 (very competent), your level of competence in Managerial Skills:

	1	2	3	4	5	6	7
01. I am good at problem-solving							
02. I am good at communicating my point of view and supporting new ideas							
03. I am good at motivating people and learning teams							
04. I'm good at maintaining interpersonal relationships and coordinating people							
05. I am good at developing resources and creating new competencies within the organization							

(Source: Roberts & Fusfeld, 1981)

B4. On a scale from 1 (not important at all) to 7 (very important), how much do you think technical skills are important for the realization of your entrepreneurial project?

1 (not important at all)	2	3	4	5	6	7(very important)

B5. On a scale from 1 (not important at all) to 7 (very important), how much do you think procedural skills are important for the realization of your entrepreneurial project?

1 (not important at all)	2	3	4	5	6	7(very important)

B6. On a scale from 1 (not important at all) to 7 (very important), how much do you think managerial skills are important for the realization of your entrepreneurial project?

1 (not important at all)	2	3	4	5	6	7(very important)

B7. Please answer with Yes/No if you have recently taken any of the following actions to establish a newcompany:

	Yes	No
01. Discussed product or business idea with potential customers		
02. Collected information about markets or competitors		
03. Written a business plan		
04. Started product/service development		
05. Started marketing or promotion efforts		
06. Purchased material, equipment, or machinery for the business		
07. Attempted to obtain external funding		
08. Applied for a patent, copyright, or trademark		
09. Registered the company		
10. Sold product or service		

(Source: Shirokova et al., 2016)

Section 3 – Startup glossary

C1. What is your level of knowledge of the Business Model Canvas on a scale from 1 (none) to 7 (high)?

1 (none)	2	3	4	5	6	7 (high)

C2. What is your level of knowledge of the Business Model in the field of entrepreneurship, from 1 (none) to 7 (high)?

1 (none)	2	3	4	5	6	7 (high)

C3. Of the following items, identify those INCLUDED/EXCLUDED from the Business Model Canvas and write the corresponding number in the correct box:

1. Bootstrapping
2. Crowdfunding
3. Value proposition
4. IPO
5. Revenue streams
6. Elevator pitch
7. Customer segment

C4. The business model in innovative entrepreneurship is scalable when:

1. Revenues grow more than proportionally to costs
2. Costs grow more than proportionally to revenues
3. Break-even point is reached
4. None of the above

Section 4 – Feedback on mentorship

D1. On a scale from 1 (not at all) to 7 (very), evaluate how much the mentors have helped you:

	1	2	3	4	5	6	7
01. To use entrepreneurial language							
02. To improve the value proposition of the entrepreneurial project							
03. To align the elements of the business model canvas with the value proposition of the entrepreneurial project							
04. To effectively present the entrepreneurial idea in front of an audience (potential investors and buyers)							

(Serpente and Bolzani, 2022)

Section 5 – Vicarious learning

[If A2_01 = Yes Or if A2_02 = Yes]

E1. For each member of your entrepreneurial project team applying for the Start Cup 2022, indicate how that person often shares their previous experiences, skills, or knowledge with you to aid your learning on a scale from 1 (not at all) to 7 (a lot):

[Name and last name]	1(not at all)	2	3	4	5	6	7 (a lot)

(Source: Myers, 2021)

E2. For each member of your entrepreneurial project team applying for the Start Cup 2022, indicate how you are able to draw meaningful lessons from the experiences and information that [that person] shares with you on a scale from 1 (not at all) to 7 (a lot):

[Name and last name]	1(not at all)	2	3	4	5	6	7 (a lot)

(Source: Myers, 2021)

[If A2_01 = Yes OR if A2_02 = Yes]

E3. Please indicate to what extent your team has engaged in learning during the Start Cup 2022—such as gathering information or asking questions—from the following sources, on a scale from 1 (not at all) to 7 (very):

	1	2	3	4	5	6	7
01. Academics							
02. Industry experts							
03. Other entrepreneurial teams (from the Start Cup 2022)							
04. Second-year Master's students							
05. Personal network contacts (external to the Start Cup 2022)							

(Source: Myers, 2021). Note: In parentheses are the author's additions.

Section 6 – Entrepreneurial intention

F1. Please rate from 1 (very low) to 7 (high)...

	1	2	3	4	5	6	7
01. The extent to which you plan to start your company (within one year) after the end of the Start Cup 2022 is...							
02. The extent to which you plan to start your company one day (within three years) after the end of the Start Cup 2022 is...							

(Source: Hallam et al., 2016)

F2. How likely are you to start a business in the next five years on a scale from 1 (unlikely) to 7 (very likely)?

1 (unlikely)	2	3	4	5	6	7 (very likely)

(Source: Krueger et al, 2000)

F3. Answer with Yes/No if you intend to start a business:

01. Solo, without the members of the team applying for the Start Cup 2022
    1. Yes
    2. No
02. With members of other entrepreneurial teams that participated in the Start Cup 2022
    1. Yes
    2. No
03. With none of the individuals who participated in the Start Cup 2022
    1. Yes
    2. No
04. With other individuals external to the Start Cup 2022 program
    1. Yes
    2. No
05. I do not intend to start a business
    1. Yes
    2. No

Section 7 – Antecedents of intention

G1. In what measure do you agree or disagree that the following factors are important to consider in the decision of your professional path on a scale from 1 (strongly disagree) to 7 (strongly agree)?

	1	2	3	4	5	6	7
01. Economic security							
02. Stable employment							
03. Career advancement opportunities							
04. Obtaining a promotion							
05. Freedom							
06. Independence							
07. Being your own boss							
08. Being able to choose one's own job tasks							
09. Having the power to make decisions							
10. Having authority							

(Source: Kolvereid, 1996)

G2. Indicate to what extent you agree or disagree with the following statements on a scale from 1 (not interested at all) to 7 (very interested):

	1	2	3	4	5	6	7
01. My family thinks I should not pursue a career as a self-employed person							
02. My friends think I should not pursue a career as a self-employed person							
03. People who are important to me think that I should not pursue a career as a self-employed person							

(Source: Kolvereid, 1996)

G3. Please indicate the extent to which you agree or disagree with the following statements from 1(very difficult(s) to 7(very easy):

	1	2	3	4	5	6	7
01. For me, being self-employed would be.							
02. If I wanted to, I could easily pursue a career as a self-employed person							
03. As a self-employed person, having control over the situation would be							
04. Having events beyond my control that could prevent me from being self-employed would be							
05. If I became self-employed, the chances of success would be							
06. If I were to pursue a career as a self-employed person, the chances of failure would be							

(Source: Kolvereid, 1996)

Section 8 – Exogenous events

H1. Please indicate whether one (or more) of the following significant events happened to you during the past few months:

01. You get married
    1. Yes
    2. No
02. You won the lottery
    1. Yes

2. No

03. You had an unexpected death
    1. Yes
    2. No

04. You got a job promotion
    1. Yes
    2. No

05. Other:

5. PAPER III - QUANTITATIVE

How Do Pre-Incubation Programs Foster New Venture Creation? Evidence From a Regression Discontinuity Design[1]

ABSTRACT

Given the public investment in pre-incubation programs to support new venture creation, it is key to assess their effectiveness. Literature acknowledges their impact, yet the extent of their effect still needs to be quantified. To fill this gap, this paper examines the impact of pre-incubation program participation on new firm creation. Using detailed data on 318 program candidates between 2017 and 2020, we find that the effect of the pre-incubation program is positive and marginally significant for all entrepreneurial projects. Evidence suggests that it gets stronger and more pronounced for digital (e.g., software, hardware) and non-significant for non-digital ones (e.g., manufacturing, food). We offer implications for entrepreneurship research and public policy.

Keywords: public funding; pre-incubation programs; new venture creation; intervention

[1] A version of this paper has been accepted at the Academy of Management Conference 2024, in Chicago, co-authored with Riccardo Fini.

5.1. Introduction

A key challenge for embryonic business is to secure adequate resources to invest in technology and commercialization activities. This challenge is particularly pronounced for innovation-oriented entrepreneurial ventures (Autio & Rannikko, 2016; Wang et al., 2017). This has been used as a justification for support from pre-incubation programs.

In the past decades, pre-incubation programs have been established to help aspiring entrepreneurs socialize entrepreneurship. A pre-incubation program is defined as a facility that supports embryonic business (before birth) by providing training and assistance to aspiring entrepreneurs and startup teams during their planning stage (Bielicki, 2023). Typically, such programs target start-ups with a high innovation potential (Hottenrott & Richstein, 2020). By focusing on certain technology areas, these programs' support can also be directed at technological fields that promise societal returns (Mahoney et al., 2009; Mazzucato, 2011; Ács, 2015).

Since many of pre-incubation programs are publicly funded (Mahoney et al., 2009), it is important to understand the extent to which and under what conditions they are effective in bringing about positive outcomes for beneficiaries. Prior research suggests that pre-incubation programs focused on commercialization activities may play a role in helping nascent entrepreneurs establish new ventures (Elert et al., 2015). Despite these insights, while studies of pre-incubation programs have proliferated along with the programs themselves, there are still several important knowledge gaps in this literature. One is that evidence for the effectiveness of pre-incubation programs is not unanimous and often stems from the type of support they offer (Åstebro & Hoos, 2021). These conflicting findings suggest that the effectiveness of pre-incubation programs may depend on boundary conditions that previous studies have not yet investigated. In this study, we focus on the combination of technology and market uncertainty that startups face (Abernathy & Utterback, 1978). Start-ups in various sectors have varying degrees of uncertainty between these two types (Fini et al., 2023). Because pre-incubation programs typically place greater emphasis on supporting technological innovation compared to commercial innovation (Lyons & Zhang, 2018), we explore the extent to which such programs will be more effective for startups facing lower technology risk relative to market uncertainty.

This research aims at answering the following research question: *Do pre-incubation program foster new venture creation? If yes, how?* Our central thesis argues that pre-incubation

programs are more effective in facilitating the commercialization of digital[2] innovations (e.g., information and communication technology), which are typically afflicted by pronounced market uncertainty, compared to innovations in other product sectors (e.g., manufacturing or food). Given that no prior studies have considered whether the effectiveness of pre-incubation programs varies across technologies and industries, our findings have important implications for understanding policy design for new venture creation. Empirically, we consider the specific case of a pre-incubation program in Italy. To explore our conjecture, we leverage internal administrative data employing a quasi-experimental research design (Imbens & Lemieux, 2008; Imbens & Kalyanaraman, 2012) to investigate the effectiveness of the program. Our sample includes information on 318 candidate projects for the pre-incubation program between 2017 and 2020.

Our findings indicate that the effect of the pre-incubation program is positive and marginally significant for all entrepreneurial projects. It gets stronger and more pronounced for digital projects and non-significant for non-digital ones. Thus, the effectiveness of the pre-incubation program depends on the type of uncertainty it aims to mitigate. Since digital products are often exposed to higher market uncertainty than technological uncertainty, the support of the program facilitates their market entry. We corroborate the results through interviews with participants in the pre-incubation program and found that pre-incubation activities are particularly beneficial for digital projects, as they receive market validation, thus accelerating the entry process.

This paper enhances our understanding of how pre-incubation programs are effective (Lyons & Zhang, 2018). Given the increasing role of pre-incubation programs in the entrepreneurial landscape, our study provides evidence that they work. Second, our research brings to light the effects of support for digital and non-digital projects, delving into the mechanisms through which the pre-incubation program is effective. Thus, while prior research emphasizes the importance of theoretical (Lackéus & Williams Middleton, 2015) or process-based approaches in pre-incubation programs (Nabi et al., 2017), our research suggests that business ideas also benefit from extensive and intensive consultation with external actors (e.g., industry, potential customers, business angels, venture capitalists) (Patel & Fiet, 2009), as this can both expand networks and prevent the exploration of market opportunities that should remain unexplored.

[2] We use the definition of digital by (Fini et al., 2023), which includes information and communication technology.

This research has policy and practical implications. The effectiveness of pre-incubation support is conditional upon the kind of uncertainty this program is supposed to reduce. Because digital firms are characterized by lower technological uncertainty relative to market uncertainty, a pre-incubation program appears to be beneficial as it provides the time and resources to expedite their market entry. Therefore, on the one hand, managers of pre-incubation programs are called to carefully (re)design their curriculum to assess whether the training content meets the different needs of both digital and non-digital firms. On the other hand, policy makers should prioritize investments in initiatives that accelerate the commercialization of technology. Taking these implications into account, both pre-incubation managers and policymakers can help foster a more favorable environment for start-ups, thereby fostering innovation in their local ecosystems.

5.2. Prior Research

5.2.1. Pre-incubation program to boost firm creation

Policy makers, in collaboration with universities and research laboratories, have launched numerous pre-incubation programs to assist early-stage start-ups, particularly in the digital sector. The rationale is that although the progress achieved by digital technologies in recent decades is remarkable (Kostin, 2018), the decision-making process of market entry by digital companies is hampered by market uncertainty (Kauffman et al., 2015; Shepherd et al., 2015). Market uncertainty is due to uncertainty of consumers, regulatory responses, or IT-driven changes in operational and transactional performance (Kauffman et al., 2015). Digital firms are subject to a rapid life cycle with initial development, market deployment and obsolescence, and intense competition due to the easy replicability of products (West & Noel, 2009; Gupta & Bose, 2022). For aspiring entrepreneurs, these represent a deterrent to market entry, corroborated by the (lack of) entrepreneurial skills to run a new venture successfully (Wu & Knott, 2006). Given these conditions of uncertainty between digital technology and the market, policy makers implemented pre-incubation programs to alleviate the difficulties faced by nascent entrepreneurs. A pre-incubation program is defined as a "facility that supports embryonic business (before birth) by providing training and support for aspiring entrepreneurs and startup teams during their planning stage" (Bielicki, 2023). It builds on the foundational principles of entrepreneurship by providing initial training in basic business principles, boosting entrepreneurial skills, and facilitating networking. It is suitable for those who are new to entrepreneurship and looking for foundation

knowledge on new venture creation, on how to build a team, aimed at successfully starting a new business. Pre-incubation programs adopt a more preparatory and adaptive methodology, offering transversal training programs to educate people with different backgrounds and levels of expertise. Aimed at those with an interest in entrepreneurship and a desire to test the viability of their ideas in the marketplace, the objective is to cultivate an entrepreneurial mindset and promote entrepreneurial awareness. With the ability to accommodate a wide range of people, pre-incubation programs are driven by the mission of "socializing entrepreneurship". Their offering includes a safe environment where aspiring entrepreneurs can test and develop their business ideas before establishing a company (Wirsing et al., 2002; Kirby, 2006) or university spin-offs. University spin-offs are typically founded to commercialize early-stage technologies from university laboratories that are difficult to evaluate (Fini et al., 2022), and are often led by early-career academics who aim to exploit their research results for commercialization purposes (Lacetera, 2009). Pre-incubation programs can provide the resources to reduce market uncertainty by performing a thorough analysis of customers and potential investors and investing in proofs of concept of the technology in real industrial environments.

Globally, pre-incubation programs are a solution to address youth unemployment[3] by helping people enter the labor market (Betcherman et al., 2007). Existing research focuses on promoting participants' aspirations in line with a social mission (Åstebro & Hoos, 2021). These programs are predominantly affiliated with universities (Souitaris et al., 2007; (Oosterbeek et al., 2010; Von Graevenitz et al., 2010; Voisey et al., 2013; Elert et al., 2015; Fairlie et al., 2015; Rauch & Hulsink, 2015; Passaro et al., 2017; Lyons & Zhang, 2018), except Fairlie et al. (2015). Previous studies have examined the immediate effect of participation in such programs on a limited set of outcomes, with mixed results. For example, Oosterbeek et al. (2010) found no treatment effects on the treated on eleven non-cognitive skills, along with a significant decrease in entrepreneurial intentions. In contrast, Rauch & Hulsink (2015) and Passaro et al. (2017) reported positive treatment effects on entrepreneurial behavior and intention, respectively. Few studies have extended their analysis to explore the broader implications of the training provided, such as its impact on firm creation. For example, Lyons & Zhang (2018) observed that participation in the

[3] The Youth Employment Inventory (YEI) has proven documentation of current and past programs and includes evidence from 289 interventions from 84 countries in regions from the OECD, Eastern Europe and Central Asia, Latin America and the Caribbean, Sub-Saharan Africa, and Asia. A total of 33 innovation subsidy programs for skill training have been counted in these regions. For further information, please refer to Betcherman et al. (2007).

program is correlated with an increased likelihood of subsequent entrepreneurship, particularly among those with no previous entrepreneurial experience. In contrast, Elert & Wennberg (2015) and Åstebro & Hoos (2021) identified a positive effect of the program on new firm creation for all participants, while Souitaris et al. (2007) found a null effect. The effectiveness of pre-incubation programs in supporting firm creation may vary greatly between different start-ups which makes it difficult to compare impact (Colombo et al., 2016). This may be because some benefit more from the training they receive as they receive specific content that suits their needs or belong to different industry sectors (Van Stijn et al., 2018). This mixed picture may arise from unrecognized boundary conditions for the effectiveness of pre-incubation programs.

Among the possible reasons may be that some nascent entrepreneurs may benefit more from pre-incubation programs because they are involved in an entrepreneurial ecosystem that provides them with additional resources (e.g. venture capitalists, business angels or industry experts) that may complement the resources typically offered and this may influence the different dynamics and (future) capital investments in start-ups. Generally, knowledge useful to the new venture is developed either through relevant personal experiences or by accessing relevant knowledge possessed by others through joint search (Tyre & Hauptman, 1992). Since entrepreneurship is synonymous with experimenting (Kerr et al., 2014), entrepreneurs have the opportunity to model results and mitigate uncertainties through “lean startup method" within pre-incubation programs. Hypothesis testing enables them to address market uncertainty, preventing it from impeding new firm creation, aided by systematic research (Patel & Fiet, 2009). Specific knowledge acquired through targeted information acquisition can further reduce uncertainty, overcoming previously perceived barriers to market entry. McKelvie et al. (2011) point out how increased uncertainty, the speed of technological change and the predictability of its impact can influence an entrepreneur's willingness to act on an opportunity. However, decision-making methods, such as systematic research (Patel & Fiet, 2009), positively influence start-up decisions either through direct engagement or indirect reliance on networks. Therefore, careful (business) planning in pre-incubation programs allows for greater insights and more informed decisions. The timely acquisition of knowledge and resources to build a customer base maximizes returns for future investors and shareholders (Kauffman et al., 2015). Through these initiatives, policy makers seek to create a favorable environment for entrepreneurship in digital sectors, enabling aspiring entrepreneurs to navigate the uncertainty of the market and realize their innovative visions.

In this paper, we explore a specific boundary condition that likely plays an important role in determining whether and how a pre-incubation program can be effective in supporting new firm creation. As a measure of the pre-incubation effectiveness, we consider whether the treated project has been established. We follow the assumption by Fini et al. (2023) that early-stage technology firms differ in terms of the balance between technology risk and market risk inherent in their project (Abernathy & Utterback, 1978). On the one hand, digital firms are typically more mature in their technology than any commercialization project, thus facing uncertainty concerning target market, target need and commercial feasibility (Camuffo et al., 2020). On the other hand, non-digital firms often require further technical development to obtain proof of concept and demonstrate the scalability of the business idea.

Existing studies indicate that pre-incubation programs may have limitations in evaluating technology, leading them to prioritize commercialization activities, thereby mitigating market uncertainty for nascent entrepreneurs. This raises questions regarding whether the efficacy of pre-incubation programs varies based on the interplay between technological and market uncertainty inherent in early-stage business ideas. Specifically, ventures with lower technological uncertainty relative to market uncertainty might derive greater benefits from participating in a pre-incubation program. To explore this aspect, we examine the impact of pre-incubation programs across different industrial domains and product spaces where new ventures are supposed to enter. We suppose that digital innovation differs significantly from innovation in sectors like manufacturing and food, given its dynamic nature, and reliance on integration within complex ecosystems. Consequently, we argue that pre-incubation programs are more effective for digital projects than for other industries. To empirically test this conjecture, we analyze the effects of a pre-incubation program in Italy using a regression discontinuity design. This approach allows us to compare nearly identical business ideas that received awards from the program to those that did not, shedding light on the program's impact on new venture creation.

Next, we outline our empirical context, illustrate the data collection methodology, describe the analytical approach, and present the results. Then, we provide a more detailed conceptual elaboration and interpretation of our overall finding that the effectiveness of the pre-incubation program is positive for digital projects, compared to those associated with other sectors.

5.3. Research design and methodology

5.3.1. Empirical context

The research context for this study is a pre-incubation program[4] in the Emilia-Romagna Region in Italy, which has been actively engaged for over twenty years in creating conditions to foster the birth and growth of innovative firms (Fini et al., 2008). The pre-incubation program welcomes individuals aspiring to launch initiatives aimed at developing innovative products. The program application is submitted by an individual proponent and not by the team. Our knowledge is limited to the applicant and does not extend to team members: we do have information on the team's size, whether it consists of a single individual or multiple individuals. Selection of beneficiaries involves an in-depth process in which participants are chosen from a pool of applicants. The final decision rests with ART-ER[5] but is influenced by the suggestions of an internal and external jury. This panel is composed of industry experts who evaluate the applications and assign scores based on the criteria outlined in the call for applications. The model of the pre-incubation program we study features six-month immersive activities that foster collaboration among various actors, including academics (PhDs, post-docs, and professors), coaches, mentors, industrial experts, venture capitalists, and entrepreneurs. The program is financially supported by ART-ER in conjunction with European funds and private sponsorships. Following the screening stage, participants enter Phase 1 of the program, known as the Bootcamp. This phase involves three days of training focused on Business Models and Value Propositions. The Bootcamp concludes with a pitching day, during which participants present their business ideas to a panel of experts in the field. The jury then selects a maximum of ten projects to advance to Phase 2 of the program. In the second phase, the chosen projects receive intensive entrepreneurial training and engage in weekly interactions and discussions with mentors[6]. The objective of this phase is to develop the final document, namely the business plan. Throughout the second phase of the program, additional industry events featuring experts from outside academia are conducted online in the form of 30-

[4] The selected time frame of the data collection for the present study includes projects submitted from the year 2017 to 2020, as archival data collection before 2017 was not feasible.

[5] https://www.art-er.it/chi-siamo

[6] The mentors in the years under study (N=9) are mainly male, representing 78% of the total. As regards educational level, most mentors have a Postgraduate Master's Degree (44%) followed by a Master's degree (33%) and a PhD (11%). Most mentors obtained their education in northern Italy (67%), while 22% studied abroad. As regards work experience, 22% of mentors have 3 years' experience as a mentor, while 22% have 7 years' experience. One mentor has 2 years of experience, while 44% provided no information on work experience.

minute speeches, further enriching the participants' learning experience. At the end of Phase 2, a maximum of 4 competition winners are declared, receiving a cash prize. This amount may vary each year based on private sponsorships, typically ranging around 10,000 euros for the first-place winner and 5,000 euros for others in the ranking. All other participants who enter the pre-incubation program without winning will not be entitled to any financial incentive.

5.3.2. Data collection, sample, variables, and measures

The data we analyze derives from various sources. We utilize information obtained directly from the pre-incubation program, including project scores and applicants' characteristics. We supplement this data with information about firm creation by the Aida Bureau van Dijk[7] and the Italian Chamber of Commerce[8] sources. The use of internal data is one of the novel elements of this project. We could leverage internal administrative documents for the comparative analysis of evaluations between successful and unsuccessful applications. We collected comprehensive longitudinal data from both the treatment and control groups. Our data includes 318 pre-incubation project applications from the program cohorts of the years 2017-2020. Table 5.1 reports the number of applications and the percentage accepted per year. In 2019, for instance, the acceptance percentage was notably high, reaching 76.9%, whereas in 2017 and 2020, the percentage was lower, 29% and 30%, respectively.

– – Insert Table 5.1 about here – –

The treatment group consisted of 120 projects that obtained training, while the control group consisted of 198 projects that did not. Table 5.2 shows the descriptive statistics of the full sample and subgroups divided by digital[9] and non-digital[10] projects.

– – Insert Table 5.2 about here – –

Data collection lasted about eight months, starting in May 2022, and ending in January 2023. The initial data set was obtained from annual archival documents during face-to-face

[7] https://www.bvdinfo.com/en-gb/our-products/data/national/aida
[8] www.registroimprese.it/start-up-innovative
[9] The digital sample includes business ideas related to information and communication technology, including both software and hardware.
[10] The non-digital sample includes business ideas broadly related to manufacturing and food industry.

meetings with the project manager of the competition. This data included candidate information (e.g., first name, last name, educational background) along with a concise description of the project. The second part of the collected data consisted of the minutes of the evaluation committee in charge of selecting the competition projects. During the data transfer, the project manager removed the names of the judges involved in the project selection for privacy issues. The last stage of data collection involved information on the establishment of the participating project after the competition using Aida Bureau van Dijk and the Italian Chamber of Commerce collected this information. During this data collection phase, several online meetings were conducted with the project manager to validate and cross-reference the information, ensuring triangulation.

While most of our measures are self-explanatory, some require clarification. Because raw project scores are not comparable across application years, we normalized the *forcing variable* of the *project scores* by subtracting the acceptance cutoff of the observation year of the program from the raw score. By doing so, we defined the cutoff as equal to zero for all years of the program, making the scores comparable across various years. We followed Wang et al. (2017), specifically:

$Project\ Score_{it} = (Raw\ Project\ Score)_{it} - (Pre\text{-}incubation\ Threshold\ Score)_{t}$ where *i* represent each project submitted for the pre-incubation program and t indexes each program year. Therefore, positive *Project scores* indicate that evaluators rated the project above the threshold for treatment; negative *Project scores* indicate the opposite. *Firm creation*[11], our dependent variable, is operationalized using a dummy (equal to 1 if the firm has been established after the pre-incubation participation and 0 otherwise). We have constructed an *Accepted* indicator, operationalized as a dummy (equal to 1 if the individual was accepted into the program and 0 otherwise), determined by the acceptance or rejection of projects within the pre-incubation program. This indicator is also referred to as the *treatment variable*.

We incorporate multiple variables to address the variability in the project. The first set of control variables focuses on project characteristics that could influence the establishment of the firm. We look at whether the idea for the competition originates from a *research center* (a dummy equals 1 if the project is from a research center and 0 otherwise). Additionally, we account for

[11] First, we conducted a thorough analysis to determine whether the business idea was founded by the respective proponent, using a cross-search through Aida Bureau Van Dijk and the Chamber of Commerce. Second, to validate this information, we organized several meetings with the managers of the pre-incubation program. During these meetings, we discovered that other business ideas coming from the pre-incubation program had been founded by members of the start-up team. Thanks to this triangulation process, we were able to confirm with certainty whether or not all the business ideas that had applied for the pre-incubation program had been founded.

factors such as the team with multiple proponents *(team size)*, demographic characteristics of proponents i.e., *age, gender* (a dummy equal to 1 if the individual is male and 0 otherwise), *years of study*, and whether the project is *digital* (a dummy equal to 1 if the project is digital and 0 otherwise).

5.4. Results

5.4.1. What explains selection into the pre-incubation program?

In our analysis, we explore three key questions: First, we analyze what characteristics of project applications enable entrepreneurs to be selected for the pre-incubation program, i.e., what determines selection into treatment. Second, we examine whether participation in the pre-incubation program has an impact on firm creation, that is, whether pre-incubation induces a treatment effect. Third, we explore the boundary conditions, that is, how the effect of the pre-incubation program is subject to a product-specific condition related to different industries.

Our capacity to address these questions is rooted in the utilization of internal administrative data. In many cases, researchers exploring pre-incubation treatment are acquainted with the characteristics of those projects that receive treatment but have no information about those rejected. In such scenarios, scholars keen on evaluating selection and treatment effects often employ control groups, utilizing propensity score matching techniques (Elert et al., 2015). This approach makes it possible to identify a cohort of projects whose characteristics may align with those of applicants along observable dimensions but who may not have sought treatment. While the method facilitates comparisons between treated projects and a group of similar entities, it does not elucidate the factors that influence the specific decision to fund some applicants over others, leaving open the possibility that unobserved factors play a key role in funding decisions (Wang et al., 2017). Our ability to compare all applicants using information on project application scores alleviates many of these concerns.

First, we use OLS regressions to test which project, entrepreneur-level features are associated with higher evaluation scores. Second, we conduct logit regressions to investigate the antecedents of acceptance into treatment. Table 5.3 reports the results of regressions on project scores and acceptance into the pre-incubation program.

– – Insert Table 5.3 about here – –

The results of the OLS analyses showed that some factors significantly influence the project score, providing valuable insights into the determinants of project evaluation. In the full sample, for each additional unit of team size and years of study, the project score increases by 0.30 units ($p < 0.01$) and 0.08 units ($p < 0.05$) respectively. For the digital sample, the observed patterns echo those identified in the full sample. The variables' team size and years of study remain crucial factors, demonstrating a substantial positive effect on project scores. Specifically, a one-unit increase in team size and years of study is associated with a 0.24 ($p < 0.01$) and 0.07 ($p < 0.10$) unit increase in project score, respectively. Moreover, in the non-digital sample, a one-unit increase in team size is associated with a 0.47-unit increase in project score ($p < 0.01$). These findings provide valuable insights into the dynamics of project assessments, suggesting that considerations of team size and educational backgrounds play pivotal roles in shaping the perceived quality of projects within the context under study.

On the other hand, the results of the logit models reveal crucial insights into the factors influencing the probability of selection into treatment. In the full sample, we observe that each additional score point in team size is related to an 18 per cent reduction in the probability of program acceptance ($p < 0.10$). Narrowing the focus to the digital sample, a more pronounced negative relationship emerges. Specifically, each additional point in team size is associated with a 29 per cent reduction in the probability of program acceptance ($p < 0.10$). This suggests that in the digital sample, larger team sizes have a greater negative impact on the probability of program acceptance than in the full sample.

In summary, in OLS analysis, we observe that an increase in team size is associated with a positive and significant increase in project scores. However, when we turn to the Logit analysis, which assesses the probability of project acceptance, the effect of team size may manifest itself differently. The negative coefficient suggests that although a larger team may lead to higher scores, it may also increase complexity or operational challenges, reducing the overall probability of acceptance into treatment.

5.4.2. Impact of pre-incubation program on firm creation

Investigating the efficacy of pre-incubation programs poses challenges, due to biases introduced by selection. Therefore, a quasi-experimental design is essential, enabling the examination of changes in firm creation before and after the intervention. Addressing these

challenges requires longitudinal data from both treated and untreated projects, spanning a sufficiently extended period to allow them time to establish and grow. However, obtaining access to this data is complex, due to concerns surrounding the privacy of participants.

In this study, we use a quasi-experimental research design to identify the causal effect of receiving pre-incubation treatment on the subsequent firm creation. The *Project Scores* allow us to apply a Regression Discontinuity Design that enables us to separate selection effects from treatment effects. Notably, these analyses enable the identification of Local Area Treatment Effects around the regression discontinuity threshold (Imbens & Lemieux, 2008). Therefore, we can identify the impact of this program by simply comparing projects that scored just below and just above the cutoff. For instance, if those who met the cutoff (and were consequently accepted into the training) exhibited greater performance than projects that narrowly missed the cutoff (resulting in their rejection from the training), it could be inferred that the treatment positively influenced firm creation. This strategy leverages the intuition underlying the regression discontinuity design that applications just above and just below the funding cutoff will be likely to differ in terms of firm creation.

5.4.3. Regression Discontinuity Design: assumptions and conditions for analysis

Although projects receiving significantly high scores may show systematic differences from those with lower scores, it can be assumed that projects with scores just above and below the funding threshold do not differ in the quality of their projects. Instead, the difference lies only in their likelihood of being selected for training. If, indeed, the allocation of training is random near the acceptance threshold, we could exploit this threshold within a regression discontinuity design to assess the impact of the pre-incubation on firm creation.

To be certain that a regression discontinuity analysis can identify the causal impact of the training received on firm creation, certain assumptions must be met (Imbens & Lemieux, 2008; Lee & Lemieux, 2010). First, there must be a breakpoint between the probability of training and the application scores of the projects. It is the "continuous eligibility index" assumption, which posits that the probability of training cannot be a continuous linear function of the application score. Second, there should be only one defined cutoff. Third, the outcome of the assignment (being trained or not) should not be subject to manipulation by the applicants in the sample. We will examine each of these assumptions below. We examine whether the first assumption is satisfied in

Figure 1, which plots the likelihood of a project receiving training as a function of its score. The figure suggests a clear discontinuity around the normalized score of zero, providing evidence that the first assumption is confirmed. While not casting doubt on whether regression discontinuity is an appropriate design, it indicated that Sharp RD (Regression Discontinuity) is more appropriate for assessing causality than Fuzzy RD.

– – Insert Figure 5.1 about here – –

In Table 5.2, we evaluate the fulfilment of the second assumption, presenting a summary of the scores of projects accepted for training versus those rejected. Our analysis reveals a cutoff score of zero. To examine the third assumption, the non-manipulation condition, requires that participants be unable to affect their assignment to the treated or non-treated group. We investigate this by comparing the distribution of observations around the acceptance threshold with the McCrary density test (McCrary, 2008). This test hypothesizes that a discontinuity in density at the cutoff value may suggest that applicants influence their treatment status. We implemented this test in Figure 2 (as suggested by Lee and Lemieux, 2010). We found no statistical difference between the densities of normalized project application scores on either side of the training cutoff.

– – Insert Figures 5.2 and 5.3 about here – –

A key point to keep in mind is that, even if the assumptions are met, regression discontinuity analyses provide insights into the treatment's impact in the local area of the training threshold, that is, the Local Area Treatment Effects (LATE). Thus, while regression discontinuity designs enable causal inference, they do so at the expense of generalizability.

5.4.4. Main analysis from the Sharp Regression Discontinuity Design

In our main analysis, we investigate how receiving the treatment has an impact on firm creation. We present the results of a Sharp RD, which we have reported to be the most reliable approach. Theory suggests that the choice of bandwidth is critical to have a window that includes projects whose quality is indistinguishable and whose outcomes will, therefore, differ only because of some having quasi-randomly received the training treatment (Cattaneo et al., 2019). In practice, there are several ways to determine the optimal window, including the inspection of observables around alternative windows and more formal methods (G. Imbens & Kalyanaraman, 2012;

Cattaneo et al., 2019). These methods recognize a tradeoff: the selection of a smaller bandwidth (h) in local polynomial approximation serves to diminish the misspecification error, commonly referred to as "smoothing bias." However, this choice concurrently increases the variance of the estimated coefficients due to a reduced number of observations available for estimation. Conversely, opting for a larger bandwidth leads to more smoothing bias when the unknown function deviates from the polynomial model used for approximation. Still, it diminishes variance as a larger number of observations fall within the interval [c − h, c + h]. We employ both the bandwidths within the manual inspection and the mean-squared-error (MSE) optimal bandwidth selector by Imbens & Kalyanaraman (2012). For robustness, we operationalize the outcome variable (firm creation) in alternative ways. Specifically, we examine whether the firm has been established within the same year as the pre-incubation program, within 1 year, 2 years, and 3 years after the end of the program. We show an estimation of the effect of receiving training treatment on firm creation in Table 5.4.

– – Insert Table 5.4 about here – –

For the full sample (N = 318), projects that received pre-incubation treatment exhibit a 13-percentage point increase in the likelihood of establishing a firm ($p < 0.10$). The significance of this effect remains positive for firms established within 2 and three years of the treatment (0.13; $p < 0.10$ and 0.14; $p < 0.10$, respectively). This outcome aligns with our expectations, as for the pre-incubation to be deemed "effective," businesses need to be founded in the same year or within 2 years from the treatment.

This is our first key result: there is evidence that projects in our sample that undergo pre-incubation are more likely to establish a new firm. Table 5.4 also presents the results of a split-sample analysis, where we compare digital vs. non-digital projects. For the digital sample (N = 216), we observe a positive effect of receiving the treatment on firm creation (0.18; $p < 0.05$). This effect decreases when looking at firms founded in the same year as pre-incubation participation (0.15; $p < 0.05$), increases for those founded within 1 year (0.16; $p < 0.10$), and within 2 and 3 years (0.18; $p < 0.05$ and 0.18; $p < 0.05$, respectively). By contrast, for those in the non-digital sample (N = 102), we observe a positive effect of receiving the treatment on firm creation. However, this effect does not reach statistical significance (0.12; t-stat = 0.35). In particular, the effect becomes negative when considering firms founded in the same year as pre-incubation

participation or within one year of participation (note, however, that these values are not significant: t-stat = 0.67; t-stat = 0.33, respectively).

Together, these findings constitute the second key insight from our analysis: the effect of receiving the treatment on firm creation is positive and significant for digital projects. In contrast, non-digital projects do not experience a significant benefit from the training in terms of new firm creation.

5.4.5. Further analysis: logit models

The last part of the analysis focuses on exploring the "boundary condition" underlying the treatment effect. To control the extent to which the three selected moderators (i.e., accepted; gender; team size) simultaneously affected both digital and firm creation, we specify a set of moderated models. For this purpose, we used a logit model to test the moderation effect. The moderator variables are generated as an interaction between *Accepted*Digital*; *Gender*Digital*; and *Team Size*Digital*. The three boundary conditions simultaneously predict firm creation and moderate the relationship between digital and firm creation. Initially, in model 1, we tested the baseline model for the entire sample, incorporating the main independent variables. In model 2, we introduce a set of control variables. In models 3, 4 and 5, we investigate interaction effects. Finally, in model 6, we analyze the full model. We replicate the same scheme for digital and non-digital samples. The results of our logit models are shown in Table 5.5.

– – Insert Table 5.5 about here – –

We observe that in the full sample (N = 318), the effect of acceptance on firm creation increases the likelihood of firm creation (1.36; $p < 0.01$). This trend persists even after introducing control variables (1.18, $p < 0.05$) and when testing the first interaction effect (1.02, $p < 0.05$). Similarly, in the digital sample (N = 216), the effect of acceptance on the likelihood of firm creation remains positive and highly significant (1.46, $p < 0.01$). At the same time, it is marginally significant for the non-digital counterparts (1.31, $p < 0.05$). We note that the control variables (research center, team size, age, gender, and years of study) have a different impact on the likelihood of firm creation in the different samples and models. For instance, in the full sample, team size has a positive and significant effect on business creation (0.19, $p < 0.05$). This effect

decreases in the digital sample (0.18, $p < 0.05$) and increases in the non-digital sample (0.23; note, however, that this value is not significant: t-stat = 0.152).

The results indicate that the *Accepted*Digital* interaction term (see model 3) of the full sample has a positive coefficient (0.24), suggesting that the effect of being a digital project on the probability of firm creation varies depending on whether the project is accepted or rejected by the program (note, however, that this value is not significant: t-stat = 0.692). Additionally, *the Digital*Gender* interaction (see model 4) of the full sample suggests that the effect of being a digital project on the probability of firm creation differs between males and females (1.31, $p < 0.1$). Finally, the *Team Size*Digital* interaction term (see model 5) of the full sample has a negative coefficient (-0.02), indicating that the effect of being a digital project on the probability of firm creation decreases with increasing team size (note, however, that this value is not significant: t-stat = 0.17).

5.4.6. Interpretation of the results via interviews

To further interpret the mechanisms underlying the results of the quantitative analysis, we rely on qualitative data collected through interviews and informal chats with participants in the pre-incubation program under study. The interviews aimed to explore various aspects of the participants, including their motivations and expectations from the pre-incubation program, along with the training content that was most useful for the development of their business model. The first round of semi-structured interviews took place in June 2022 and was conducted via Teams or Zoom, with an average duration of 40 minutes. The interview protocol is available in Appendix (A3). The second round of semi-structured interviews was conducted in June 2023, again via Teams or Zoom, with an average duration of 25 minutes. The interview protocol is available in Appendix (A4).

First, our interviews revealed that in the sample analyzed, the motivation of individuals to enter the pre-incubation program is driven by the willingness to bridge the gap between their technical and managerial know-how.

As one informant pointed out:

> *"In the team, we all have technical skills. We do not have managerial know-how or business know-how. So, through the pre-incubation program, we want to challenge ourselves and learn how to write a business plan." (Project B, digital)*

One of the most important motivations for entrepreneurs to participate in a pre-incubation program is the aspiration to get feedback from the market to validate their business idea and refine their commercial strategy:

"From the technical point of view, we are masters of the situation, from the commercial and strategic economic point of view we have never done it. Through this program, we would like to seek support to complete this activity since when the research activity ends and we start moving toward commercialization, not having experience we don't know where we would end up." (Project I, digital)

Interviews showed that as entrepreneurial projects moved from the ideation to the commercialization stage, they struggled to assess how the market would respond to their product and identify potential customers' needs. The pre-incubation program emerged as a key factor for entrepreneurs in addressing these challenges by providing access to coaching, mentoring, and networking. These activities helped entrepreneurs develop a better understanding of the target market and gather timely feedback from potential customers and industry partners. This process helped reduce market uncertainty and adapt quickly to market needs, significantly speeding up the entry phase.

"The activities carried out with the coach were the most important and most useful part of the development of my business idea." (Project L, digital)

"The most useful part for me was the one-on-one mentorship, that is, when we were joined by an expert who was supportive and with whom we put into practice what was taught about." (Project I, digital)

Networking activities proved particularly valuable as they facilitated connections among entrepreneurs, industry professionals, and potential investors. They played a pivotal role in assisting entrepreneurs in validating their market assumptions. Through interactions with potential investors, entrepreneurs solicited feedback on their projects and refined their value propositions. This iterative process with customers, industry experts and investors, emerged as imperative for market validation.

"The program has been highly valuable in terms of expanding my network. I appreciated the fact that the program facilitates connecting aspiring entrepreneurs with businesses, allowing you to interact directly with potential clients and partners." (Project B, digital)

The effectiveness of pre-incubation programs appears to vary across different industry sectors, with digital firms benefiting most from such support. Indeed, pre-incubation programs have proven instrumental in assisting digital projects in bridging the gap between technological advances and market needs, helping them develop a network of potential customers and industrial partners and thus accelerating the commercialization of the technology. In contrast, non-digital projects have not benefited from the program to the same extent. This is because these projects had unique needs, such as specific resources and expertise for prototype development, which were not addressed by the pre-incubation program, thus slowing down the commercialization phase. Therefore, while pre-incubation programs can offer valuable resources and support for digital startups, they may not be as well suited for non-digital ones. This view may therefore have positive implications in terms of pre-incubation effectiveness for digital projects, as evidenced by our quantitative results.

– – Insert Table 5.6 about here – –

5.5. Discussion

5.5.1. Theoretical contributions

Previous research states that pre-incubation programs were established to help aspiring entrepreneurs socialize entrepreneurship. Since most pre-incubation programs focus on commercialization activities, this study examines the effect of the treatment on digital and non-digital firms. The aim is to investigate whether and to what extent pre-incubation programs prove to be more effective for start-ups that face low technological risks relative to market uncertainty. By analyzing the role played by product type and assessing technological and market uncertainty as key mechanisms, our study contributes more broadly to the literature on whether and how pre-incubation programs work (Hallen et al., 2020), determining the causal effect of treatment receipt on firm creation (Wang et al., 2017).

We analyzed the difference in effectiveness of the pre-incubation program between digital and non-digital firms. This provides an opportunity to understand the effectiveness of pre-incubation programs by differentiating the effect according to the type of industry. Moreover, what distinguishes our study is the unique research context, the use of internal administrative data, the rigorous analytical procedures employed, and the valuable insights generated. Inspired by Wang et

al. (2017), we leveraged applicants score data to estimate the causal effect of treatment receipt on firm creation using a regression discontinuity design. Based on the evidence collected and presented, our results suggest the effect of the pre-incubation program is positive and marginally significant for all entrepreneurial projects. For digital projects, those undergoing treatment demonstrate a willingness to establish a new firm soon after completing the pre-incubation program or within three years. In contrast, non-digital projects do not show a similar benefit from the treatment. For them, the probability of establishing a new enterprise decreases in the same year and one year after pre-incubation treatment.

The first explanation underpinning this finding is that digital firms – as opposed to non-digital firms - typically undergo shorter product life cycles (Eisenhardt, 1989) and are often adopted quickly by customers, underscoring the critical importance of speed to market (Schilling, 2002). This observation implies that digital products can be readily market-tested and refined based on customer feedback, thus reducing both cost and time to adoption. In our study, we demonstrate that pre-incubation programs accelerate the entry of digital products into the market through coaching, mentorship, and networking activities (Peters et al., 2004), boosting the commercial viability of digital technologies.

Another explanation for these differences could lie in the different needs of digital versus non-digital firms. Our results indicate that digital firms, taking advantage of their greater flexibility and rapid adaptability to market demands, can readily capitalize on knowledge acquired during the pre-incubation period. In contrast, non-digital projects often require further technical development to obtain proof of concept and demonstrate the scalability of the business idea, which implies a longer period to assimilate the acquired skills and adapt to market conditions, which explains the slower pace of commercialization.

These observations shed light on the empirical trends we uncovered. First, concerning new venture creation, pre-incubation produces different results for non-digital firms than for their digital counterparts. Digital projects that seek and receive pre-incubation support speed up their entry into the market. This underscores the importance of targeted resource allocation by pre-incubation programs, highlighting the need for tailored support mechanisms to accelerate technology market entry and address the specific needs of digital firms. Recognizing the unique challenges and opportunities inherent in each sector is critical to optimizing the impact of pre-incubation initiatives and cultivating a growing entrepreneurial ecosystem. The main finding of our study is that the

benefits that projects derive from pre-incubation depend on the nature of the products they intend to commercialize. This result represents a novel contribution, as previous research has not delved into the role that product or service types play in determining the effectiveness of pre-incubation programs.

5.6. Conclusions

5.6.1. Limitations and future research

Despite the considerable enthusiasm for public spending on pre-incubation programs, previous research in the field failed to provide robust evidence on how pre-incubation programs facilitate new venture creation. With this study, we significantly advance existing research. First, we discover that pre-incubation initiatives are supportive of all entrepreneurial projects. Second, pre-incubation impact is more substantial and pronounced for digital projects and not significant for non-digital ones. We have shown that the impact of pre-incubation programs on the creation of new firms is not universally positive but rather conditioned by the types of products that are intended to be commercialized.

We can draw the following conclusion: The pre-incubation program shows greater effectiveness in facilitating the commercialization of digital innovations, which suffers from high market uncertainty. Among the various forms of support provided by pre-incubation programs to their beneficiaries, access to a network of potential customers and industry experts emerges as particularly beneficial. Our argument emphasizes that by responding to the diverse needs of digital innovations, pre-incubation programs prove particularly useful and relevant in guiding digital projects through the complex and changing landscape of market uncertainty.

However, our study has some limitations. Our sample includes projects from a pre-incubation program in Italy, meaning that our findings may not be generalizable. Moreover, the sample size is relatively small and may not be representative of all pre-incubation programs. We mitigated this limitation by exploiting information that would not usually be available, allowing for a high-quality methodological approach. Using internal administrative data, we assessed successful and unsuccessful treatment effects. Based on this, we suggest that future research extend data collection to other contexts to generalize the results of this research.

5.6.2. Policy implications and practical recommendation

Our research has implications for policy and practice. First, our findings suggest that pre-incubation programs may be more effective in certain industries. Therefore, our study suggests that policy makers allocating funds could be more selective in choosing organizations that offer support to stimulate entrepreneurship. They should focus on funding programs characterized by commercial rather than theoretical activities.

Second, our research suggests to policy makers that the size and duration of the prize do not correlate with the market entry of the pre-incubated ideas. In our case, irrespective of winning the grant, the companies started their activities significantly within three years of the program.

Third, our research suggests that pre-incubation managers should be more selective in terms of business ideas selected for the program. They should focus on projects characterized by low technological risk and high market uncertainty, as opposed to those with a longer industrial life cycle. Taking these distinctions into account, program designers should consider designing tailored support activities within pre-incubation programs. For digital projects, the focus should be on facilitating networking activities to enable rapid market validation of their innovations. This could involve access to industry mentors, facilitating connections with potential investors and stimulating customer discovery in the early stages.

Fourth, our study suggests that entrepreneurs should be aware that pre-incubation programs are more effective for specific industries than for others. Therefore, they are advised to carefully consider whether the pre-incubation program they intend to apply for is in line with their needs. If it is not, it is advisable to avoid participating in it as it could delay market entry.

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5.8. Tables

Table 5. 1 - Pre-incubation program overview: applications accepted, by year, 2017-2020.

Year	Number of applications	Number of accepted	Percentage of accepted
2017	134	39	29%
2018	88	40	45.4%
2019	26	20	76.9%
2020	70	21	30%
Total	**318**	**120**	

Table 5. 2 - Descriptive statistics: 2017-2020.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Full Sample					
Application year	318	2018.101	1.17	2017	2020
Project score	318	-0.61	1.99	-6.65	2.9
Accepted					
Application year	120	2018.192	1.07	2017	2020
Project score	120	0.93	0.93	0.74	2.9
Rejected					
Application year	198	2018.045	1.22	2017	2020
Project score	198	-1.55	1.93	-6.65	-0.05
Digital Sample					
Application year	216	2017.972	1.14	2017	2020
Project score	216	-0.61	1.91	-6.65	2.8
Accepted					
Application year	79	2018.076	1.13	2017	2020
Project score	79	0.91	0.69	0	2.8
Rejected					
Application year	137	2017.912	1.15	2017	2020
Project score	137	-1.50	1.83	-6.65	-0.1
Non-Digital Sample					
Application year	102	2018.373	1.19	2017	2020
Project score	102	-0.64	2.18	-6.65	2.9
Accepted					
Application year	41	2018.415	0.95	2017	2020
Project score	41	0.97	0.83	0	2.9
Rejected					
Application year	61	2018.344	1.34	2017	2020
Project score	61	-1.72	2.14	-6.65	-0.05

Table 5. 3 - Selection models: correlates Project Score and Accepted into the pre-incubation program.

	Full Sample	**Digital Sample**	**Non-Digital Sample**	**Full Sample**	**Digital Sample**	**Non-Digital Sample**
Method	OLS	OLS	OLS	Logit	Logit	Logit
Dependent Variable	Project Score	Project Score	Project Score	Accepted	Accepted	Accepted
Research Centre	0.30	0.20	0.46	0.50	0.74	0.29
	(0.22)	(0.26)	(0.41)	(0.47)	(0.72)	(0.73)
Team Size	0.30***	0.24***	0.47***	-0.18*	-0.29*	-0.10
	(0.06)	(0.06)	(0.13)	(0.10)	(0.15)	(0.23)
Age	0.01	0.0003	0.02	.04	0.11**	-0.03
	(0.01)	(0.01)	(0.2)	(0.02)	(0.04)	(0.03)
Gender	0.27	0.12	0.56	0.69	0.24	1.34
	(0.25)	(0.32)	(0.43)	(0.54)	(0.79)	(0.83)
Years of study	.08**	0.07*	0.11	0.06	0.08	-0.10
	(0.04)	(0.04)	(0.08)	(0.07)	(0.11)	(0.12)
Digital	-0.20			0.38		
	(0.23)			(0.55)		
Project Score				3.73***	5.15***	2.84***
				(0.40)	(0.72)	(0.39)
Observations	318	216	102	318	216	102
Constant	2.51**	3.25***	0.63	-25.81***	-36.70***	-15.61***
	(0.91)	(0.98)	(1.71)	(3.52)	(5.98)	(3.08)

Robust Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. 4 - Sharp Regression Discontinuity analysis: linear probability models predicting firm creation, based on observation in the optimal Imbens-Kalyanaraman RD window and manual inspection, at the cut-off score of zero.

	Obs. Left of c	*Obs. Right of c*	*Coefficient*	*[95% Conf. Interval]*	
Full Sample (N=318)					
Bandwidth type: M1					
DV: firm founded	198	120	0.13*	-0.01	0.29
			(0.08)		
DV: firm founded within the same year	198	120	0.08	-0.02	0.19
			(0.05)		
DV: firm founded within 1 year	198	120	0.06	-0.07	0.19
			(0.06)		
DV: firm founded within 2 years	198	120	0.13*	-0.15	0.29
			(0.08)		
DV: firm founded within 3 years	198	120	0.14*	-.013	0.29
			(0.07)		
Bandwidth type: IK					
DV: firm founded	98	62	-0.005	-0.33	0.32
			(0.17)		
DV: firm founded within the same year	52	45	-0.18	-0.48	0.11
			(0.15)		
DV: firm founded within 1 year	82	56	-0.08	-0.38	0.20
			(0.15)		
DV: firm founded within 2 years	136	76	0.01	-0.29	0.31
			(0.15)		
DV: firm founded within 3 years	98	62	-0.004	-0.33	0.32
			(0.17)		
Digital Sample (N=216)					
Bandwidth type: M1					
DV: firm founded	137	79	0.18**	-0.0002	0.37
			(0.09)		
DV: firm founded within the same year	137	79	0.15**	-0.001	0.29

			(0.07)		
DV: firm founded within 1 year	137	79	0.16*	-0.01	0.34
			(0.09)		
DV: firm founded within 2 years	137	79	0.18**	-0.002	0.36
			(0.09)		
DV: firm founded within 3 years	137	79	0.18**	-0.0002	0.37
			(0.09)		
Bandwidth type: IK					
DV: firm founded	39	30	-0.12	-0.56	0.32
			(0.22)		
DV: firm founded within the same year	39	30	0.06	-0.11	0.24
			(0.09)		
DV: firm founded within 1 year	69	39	0.12	-0.20	0.46
			(0.17)		
DV: firm founded within 2 years	39	30	-0.10	-0.54	0.33
			(0.22)		
DV: firm founded within 3 years	39	30	-0.12	-0.56	0.32
			(0.22)		
Non-Digital Sample (N=102)					
Bandwidth type: M1	61	41			
DV: firm founded			0.12	-0.13	0.37
			(0.13)		
DV: firm founded within the same year	61	41	-0.03	-0.20	0.12
			(0.08)		
DV: firm founded within 1 year	61	41	-0.09	-0.29	0.09
			(0.09)		
DV: firm founded within 2 years	61	41	0.13	-0.11	0.38
			(0.12)		
DV: firm founded within 3 years	61	41	0.13	-0.12	0.38
			(0.12)		
Bandwidth type: IK					
DV: firm founded	29	23	0.13	-0.33	0.59
			(0.23)		
DV: firm founded within the same year	40	27	-0.28*	-0.62	0.05

			(0.17)		
DV: firm founded within 1 year	29	23	-0.16	-0.49	0.16
			(0.16)		
DV: firm founded within 2 years	29	23	0.13	-0.33	0.59
			(0.23)		
DV: firm founded within 3 years	29	23	0.13	-0.33	0.59
			(0.23)		

* p<0.10, ** p<0.05, *** p<0.01. Robust standard errors in parentheses, All the regression discontinuity includes covariates i.e., research center, team size, age, gender, and years of study. Within the same year = the company was founded within the same year as the pre-incubation program. Within 1 (2, 3) year, the company was founded within 1 (2,3) year(s) of the end of the pre-incubation program. MI = Manual inspection; IK= Imbens-Kalyanaraman window.

Table 5. 5 - Logit Results

	Full Sample						Digital Sample						Non-digital Sample					
	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
Accepted	1.36***	1.18**	1.02**	1.25***	1.18***	1.17**	1.46***	1.35***	1.35***	1.35***	1.35***	1.35***	1.20**	1.31**	1.31**	1.31**	1.31**	1.31**
	(0.29)	(0.30)	(0.49)	(0.31)	(0.30)	(0.54)	(0.37)	(0.39)	(0.39)	(0.39)	(0.39)	(0.39)	(0.48)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)
Digital	-	-	-	-1.31**	-	-1.43												
	0.27	0.33	0.47		0.24													
	(0.30)	(0.31)	(0.46)	(0.58)	(0.65)	(0.88)												
Research Centre		-0.19	-0.19	-0.18	-0.19	-0.18		-0.57	-0.57	-0.57	-0.57	-0.57		0.34	0.34	0.34	0.34	0.34
		(0.30)	(0.30)	(0.30)	(0.30)	(0.30)		(0.40)	(0.40)	(0.40)	(0.40)	(0.40)		(0.48)	(0.48)	(0.48)	(0.48)	(0.48)
Team Size		0.19**	0.19**	0.19**	0.21	0.41		0.18**	0.18**	0.18**	0.18**	0.18**		0.23	0.23	0.23	0.23	0.23
		(0.08)	(0.08)	(0.08)	(0.15)	(0.15)		(0.09)	(0.09)	(0.09)	(0.09)	(0.09)		(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
Age		0.002	0.001	0.0006	0.0002	0.0003		-0.02	-0.02	-0.02	-0.02	-0.02		0.02	0.02	0.02	0.02	0.02
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Gender		0.0005	0.001	-0.80	0.001	-0.78		0.48	0.48	0.48	0.48	0.48		-0.64	-0.64	-0.64	-0.64	-0.64
		(0.33)	(0.33)	(0.55)	(0.33)	(0.57)		(0.47)	(0.47)	(0.47)	(0.47)	(0.47)		(0.57)	(0.57)	(0.57)	(0.57)	(0.57)
Years of Study			0.07	0.07	0.07	0.07		0.13**	0.13**	0.13**	0.13**	0.13**		0.03	0.03	0.03	0.03	0.03
			(0.05)	(0.05)	(0.05)	(0.05)		(0.07)	(0.07)	(0.07)	(0.07)	(0.07)		(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
*Digital*Accepted*			0.24			0.12												
			(0.62)			(0.66)												
*Digital*Gender*				1.31*		1.31												
				(0.71)		(0.74)												
*Digital*Team Size*					-0.02	0.018												
					(0.17)	(0.17)												
Constant	-1.84***	-3.60**	-3.53***	-3.11**	-3.70***	-3.04	-2.17***	-4.44***	-4.44***	-4.44***	-4.44***	-4.44***	-1.74***	-3.50	-3.50	-3.50	-3.50	-3.50
	(0.30)	(1.24)	(1.25)	(1.27)	(1.29)	(1.31)	(0.28)	(1.65)	(1.65)	(1.65)	(1.65)	(1.65)	(0.36)	(2.27)	(2.27)	(2.27)	(2.27)	(2.27)
Observation	318	318	318	318	318	318	216	216	216	216	216	216	102	102	102	102	102	102
Log Likelihood	-14.77	-14.37	-14.37	-14.208	-14.37	-14.20	-95.24	-90.45	-90.45	-90.45	-90.45	-90.45	-52.44	-49.35	-49.35	-49.35	-49.35	-49.35
Chi 2	22.72	29.17	28.83	31.59	29.28	31.55	15.52	20.66	20.66	20.66	20.66	20.66	6.10	11.19	11.19	11.19	11.19	11.19

Notes: robust standard errors are in parentheses. *p<0.10, ** p<0.05, ***p<0.01. M1 = Model 1, M2 = Model 2, M3= Model 3. In M1, we first tested the baseline model. In Model 2, we add the control variables, and in Model 3,4,5 we add the interactions. In model 6 we tested the full model. Dependent variable = firm creation (0;1).

Table 5. 6 - Overview of the interviewed project.

Project	Typology	Industry	Type of interview
Project A	University spin-off	Digital	Semi-structured
Project B	University spin-off	Digital	Semi-structured
Project C	University spin-off	Non-digital	Informal
Project D	Start-up	Digital	Semi-structured
Project E	University spin-off	Digital	Semi-structured
Project F	Start-up	Digital	Semi-structured
Project G	Start-up	Non-digital	Informal
Project H	Start-up	Non-digital	Informal
Project I	University spin-off	Digital	Semi-structured
Project J	Start-up	Digital	Semi-structured
Project K	University spin-off	Digital	Semi-structured
Project L	Start-up	Digital	Semi-structured

5.9. Figures

Figure 5. 1 - Probability of training as a function of project score.

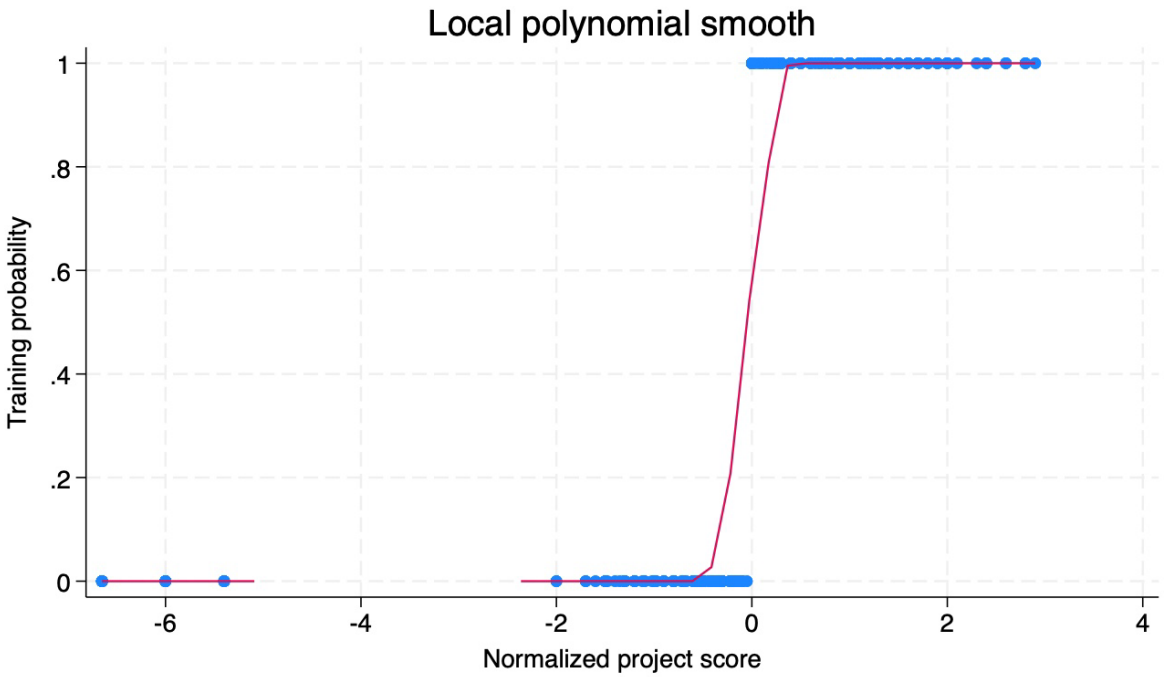


Figure 5. 2 - McCrary test for density discontinuity at the training threshold.

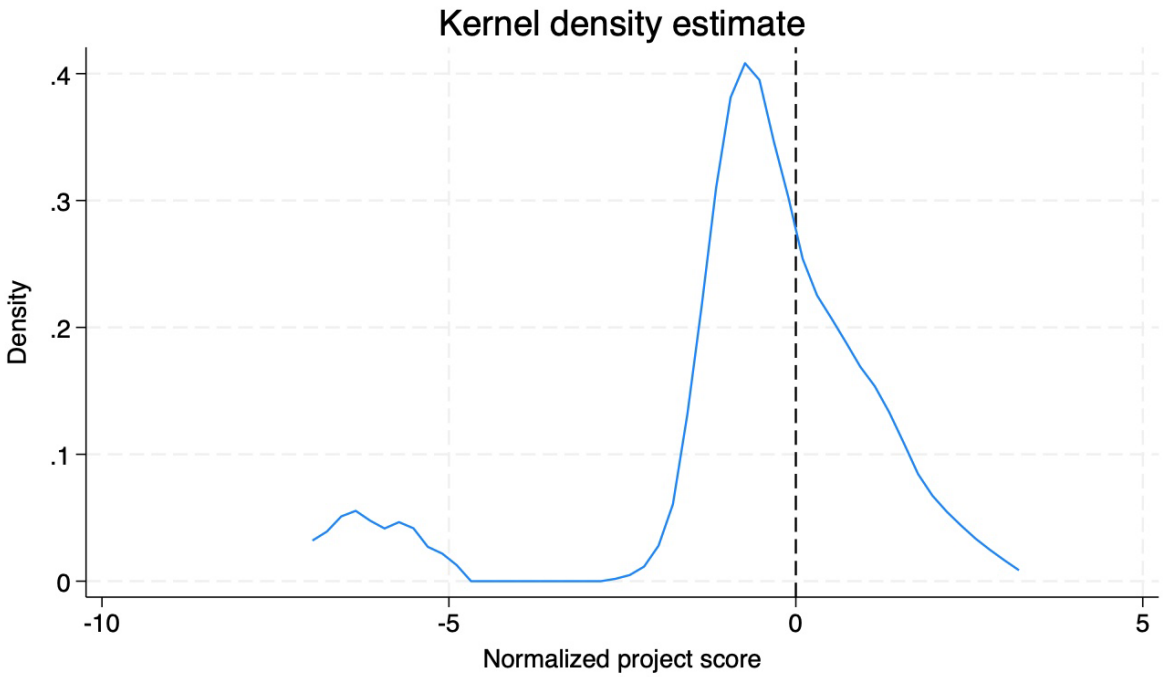
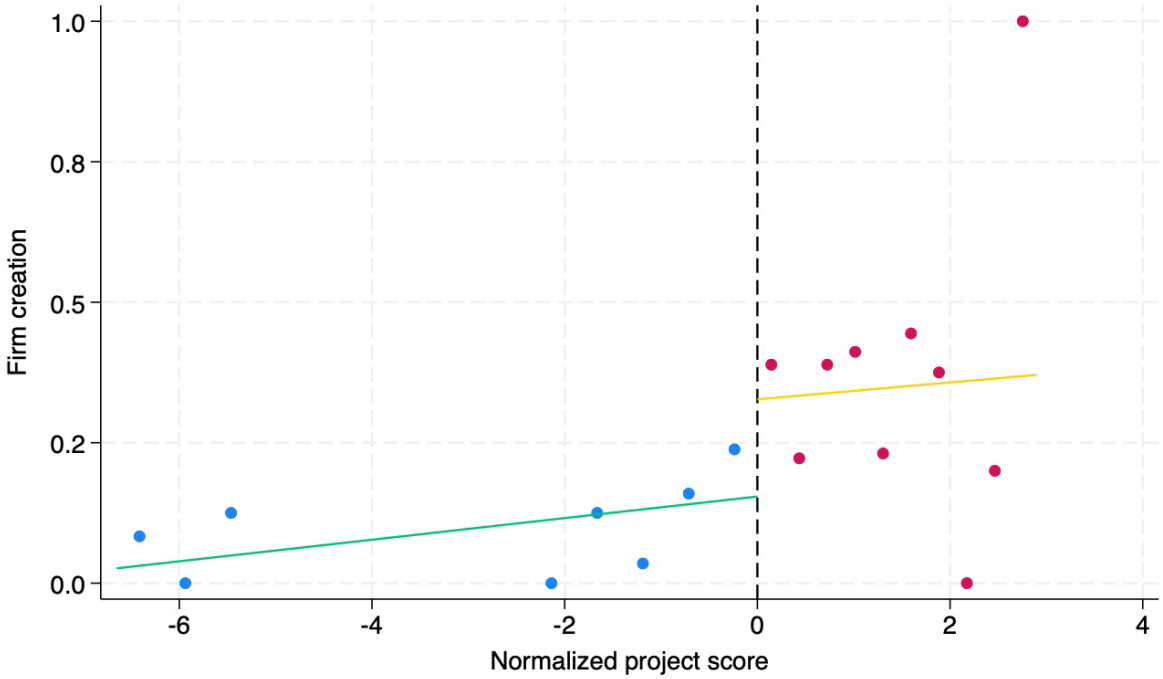


Figure 5. 3 - Baseline: graph of the Predicted Value by Normalized Project Score.



Appendix

A1. Tables

Table A5. 1 - State of the art.

Author(s)	Location	Methodology	Dep. Var.	Effect
Souitaris et al. (2007)	UK	Pre–post-test	Firm creation	Null
Oosterbeek et al. (2010)	Netherlands	Diff-in-Diff	Entrepreneurial intention	Negative
von Graevenitz et al. (2010)	Germany	Pre–post-test	Entrepreneurial intention	Negative
Elert & Wennberg. (2015)	Sweden	PSM	Firm creation	Positive
Fairlie et al. (2015)	US	RCT	Business ownership	Positive
Rauch & Hulsink (2015)	Netherlands	Pre–post-test	Entrepreneurial behavior	Positive
Passaro et al. (2017)	Italy	PLS	Entrepreneurial intention	Positive
Lyons & Zhang (2018)	US	CEM	Entrepreneurial action	Mixed
Åstebro & Hoos (2021)	France	RCT	Firm creation	Positive

Table A5. 2 - Descriptive statistics individual-level: 2017-2020.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Full Sample					
Age	318	37.92	10.10	23	72
Gender	318	0.75	0.43	0	1
Years of study	318	17.26	2.99	8	21
Accepted					
Age	120	38.28	10.03	23	72
Gender	120	0.76	0.42	0	1
Years of study	120	18.02	2.95	8	21
Rejected					
Age	198	37.70	10.17	23	65
Gender	198	0.74	0.43	0	1
Years of study	198	16.79	2.92	8	21
Digital Sample					
Age	216	37.58	9.70	23	64
Gender	216	0.76	0.42	0	1
Years of study	216	17.28	2.98	8	21
Accepted					
Age	79	38.37	8.88	23	61
Gender	79	0.74	0.43	0	1
Years of study	79	18.13	2.82	8	21
Rejected					
Age	137	37.13	10.14	25	64
Gender	137	0.78	0.41	0	1
Years of study	137	16.78	2.96	8	21
Non-Digital Sample					

Age	102	38.62	10.93	23	72
Gender	102	0.72	0.44	0	1
Years of study	102	17.21	3.02	8	21
Accepted					
Age	41	38.09	12.06	24	72
Gender	41	0.80	0.40	0	1
Years of study	41	17.80	3.22	8	21
Rejected					
Age	61	38.98	10.20	23	65
Gender	61	0.67	0.47	0	1
Years of study	61	16.81	2.84	8	21

A2. Interview protocol for participants: first round interview

Introduction to the interview:

This project studies nascent entrepreneurs in Italy, with a focus on the Emilia-Romagna region. One of the ways the region can stimulate the birth and growth of new enterprises is through pre-incubation programs such as this one promoted by ARTER. I would like to ask you to start by elaborating on some issues related to your entrepreneurial project.

[consent to registration]

1. Tell me about your entrepreneurial idea [project name]: where did the idea come from, and by whom?
2. What motivated you to apply for participation in the program?
3. What are your expectations from the training sessions?
4. Where do you see yourself in 5 years?

A3. Interview protocol for participants: second round interview

[consent to registration]

1. What is the stage of development of the entrepreneurial idea?
2. How likely do you think it is that you will establish a firm within the next year(s)?
3. Which activities or exercises carried out during the training were most useful for developing your entrepreneurial project?
4. How did the structure of the courses (practical/theoretical) and the approach of the coaches/mentors contribute to this?

6. CONCLUSION

This dissertation aims at shedding light on how entrepreneurial pre-incubation programs work, in terms of guiding aspiring entrepreneurs to transform their business ideas into new venture creations (Bielicki, 2023). Given the growing importance of pre-incubation programs in providing training and the increasing focus of scholars on entrepreneurship education in general (Rideout & Gray, 2013), this dissertation explored the previous literature related to entrepreneurship teaching and learning in the context of pre-incubation programs. To answer RQ1: *What factors motivate and influence the teaching and learning of entrepreneurship in the context of entrepreneurial support organizations, and what are the outcomes?* – it employs a systematic literature review, to collect and synthesize existing knowledge related to teaching and learning in entrepreneurial support organizations, which includes pre-incubation programs. The key findings are the following: (1) government and institutions are the main "antecedents" of entrepreneurship education and training in entrepreneurial support organizations; (2) they influence the "variety" of entrepreneurship education content offered in courses; (3) different selection processes, training methods, target groups, duration of courses, and evaluation methods indicate that numerous intervention variables influence the "outcomes" of such education and training initiatives at different levels of analysis: individual and organizational.

This research is conducted in the underrepresented context of a pre-incubation program in Italy. Specifically, the second research output provides an overview of the context in which this dissertation was developed, namely Start Cup Emilia-Romagna. Using secondary data from the 2017, 2018, and 2019 editions of Start Cup, it emerges that: (1) pre-incubation program attracts individuals with an entrepreneurial mindset; (2) regardless of acceptance into the program, these individuals start entrepreneurial activities significantly (99 out of 249, about 40 percent); (3) more than 23% of the businesses founded are innovative startups. This percentage rises to over 28% when considering projects that resulted in innovative startups not founded by the applicant but by other team participants connected to the project.

The third research output is a qualitative study that gains insights into the learning dynamics within the entrepreneurship training courses offered by pre-incubation programs (Kenney & Patton, 2011). To answer RQ2: *Do career preferences of early-career academics drive entrepreneurial learning in pre-incubation programs?* - it follows participants on their entrepreneurial journey, taking a process-oriented approach as suggested by Wright et al. (2017). The study employs a longitudinal data collection process and collects archival documents, participant observations, interviews, and surveys. The results highlighted that: (1)

participants in the pre-incubation program express two distinct research orientations (taste for science and taste for industry); (2) the pre-incubation program provides entrepreneurship education and training to incubates, guiding them to develop a distinct understanding of their career preferences (affirming or rejecting a preference for an entrepreneurship (academic) career); (3) the program provides valuable entrepreneurial competencies useful for entrepreneurship or other careers.

The fourth research output is a quantitative study that gains evidence regarding the effectiveness of pre-incubation programs in terms of new firm creation (Wang et al., 2017; Åstebro & Hoos, 2021). To answer RQ3: *Do pre-incubation programs foster new venture creation? If yes, how?* – it collects longitudinal information directly obtained from the pre-incubation program for the 2017, 2018, 2019, and 2020 cohorts, for both the treatment and control groups. This information is completed with data on business creation from the Aida Bureau van Dijk and Italian Chamber of Commerce databases. It employs a quasi-experimental research design to identify the causal effect of pre-incubation treatment on subsequent new venture creation. The key results are the following: (1) the effect of the pre-incubation program is positive and marginally significant for all entrepreneurial projects; (2) it gets stronger and more pronounced for digital (e.g., software, hardware) and non-significant for non-digital ones (e.g., manufacturing, food).

This research contributes to several streams of literature. First, it enriches the existing literature on entrepreneurial education (Davey et al., 2016) by proposing three ideotypes that are shedding light on educational approaches/methods and pedagogies that can be used to educate in entrepreneurship. Second, it contributes to the literature on entrepreneurial ecosystem (Stam & Van De Ven, 2021) by shedding light on the distinct roles that entrepreneurial support organizations, including pre-incubation programs, can play in nurturing local contact in different stages of entrepreneurial journeys, from the initial raising awareness and mindset generation to supporting scale-up and growth. Third, it contributes to the literature on entrepreneurial learning in pre-incubation programs (Williams Middleton & Donnellon, 2014; Redondo & Camarero, 2017; Ting et al., 2017; Wolf, 2017) by explaining how career preferences of early-career academics influence the learning process in pre-incubation programs. It suggests that the pre-incubation programs serve as a valuable space for exploring and testing career preferences, influencing participants' career perspectives and choices. This provides a new perspective on how individuals navigate and internalize educational experiences, thus enriching our understanding of learning mechanisms within pre-incubation programs. Fourth, by analyzing the role played by product type and assessing technological and

market uncertainty as key mechanisms, it contributes more broadly to the literature on whether and how pre-incubation programs work (Hallen et al., 2020), determining the causal effect of treatment receipt on firm creation (Wang et al., 2017).

The dissertation offers several implications. The first is for policy makers. It suggests they should consider industry specificities when allocating funds for pre-incubation programs, as some sectors may benefit more from such initiatives due to their characteristics. For instance, digital firms, which have less technological uncertainty than market uncertainty, can significantly accelerate their market entry through pre-incubation programs. Selective allocation of support is therefore recommended to maximize program effectiveness and resource utilization. Moreover, universities and governments investing in the commercialization of scientific research should give priority to facilitating networking opportunities and access to financial resources for aspiring entrepreneurs. By promoting academic entrepreneurship as a viable career path and offering resources for career transitions, these institutions can contribute to local economic development and growth. The other set of implications concerns managers of pre-incubation programs. It suggests they should adapt the entrepreneurial training contents to meet the different needs of projects in the various industries. Targeted support can improve the effectiveness of the program and increase the likelihood of firm creation. For digital projects, the emphasis should be on facilitating networking activities for rapid market validation. This may include access to industry mentors, fostering connections with investors and promoting customer research in the early stages of development. Managers should also assess the motivational profiles of potential participants to ensure alignment with program goals, thereby improving engagement and involvement from participants.

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