



**Bocconi**

*Perceived obstacles in the undertaking of the  
entrepreneurial career: an empirical study on  
STEM and business alumni*

Francesco Guberti

Dissertation written under the supervision of  
Raffaele Conti and Alfonso Gambardella

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## **Abstract page**

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**Author:** *Francesco Guberti*

**Keywords:** *entrepreneurship, entrepreneurial propensity, perceived obstacles, alumni, business, STEM, incubator, team diversity*

## **English version**

The goal of this study is to inquire the perceived expected and encountered obstacles in undertaking a career in entrepreneurship, both among university students and entrepreneurs. These perceptions were studied considering their academic background, with a major categorization between business and STEM alumni. The sample was drawn mainly among Italian citizens. Typical results have been found, such as a gender gap in the entrepreneurial propensity and a high proportion of entrepreneurs that had a mixed founding team composition. Despite no significant differences were found among university students, there are instead elements that distinguish and influence the perceptions among entrepreneurs. In particular, the experience in an incubator and the heterogeneity of the team composition appear to be perceived differently. The first element is evaluated in a relatively more favourable way by STEM alumni, while the same is true for the team composition by business alumni.

## **Portuguese version**

O objetivo deste estudo é investigar a percepção dos obstáculos esperados e encontrados no início de uma carreira em empreendedorismo, tanto entre estudantes universitários como empreendedores. Estas percepções foram estudadas tendo em consideração os seus percursos académicos, com uma subdivisão principal entre alumni de gestão e de CTEM. A amostra estatística foi retirada maioritariamente entre cidadãos italianos. Resultados espectáveis foram encontrados, como a disparidade de género na propensão a uma carreira de empreendedorismo e uma alta proporção de empreendedores que tiveram uma equipa fundadora com percursos académicos e profissionais distintos. Embora não tenham sido encontradas diferenças significativas entre os estudantes universitários, existem elementos que distinguem e influenciam as percepções entre os empreendedores. Em particular, a experiência numa incubadora e a heterogeneidade na composição da equipa parecem ser percebidas de maneira diferente. O primeiro elemento é percebido de forma relativamente mais favorável pelos alumni de CTEM, enquanto o mesmo acontece com a heterogeneidade da composição da equipa pelos alumni de gestão.

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## **Introduction**

### **Topic presentation**

The broad area of research of this thesis regards entrepreneurship, and more specifically the character of the entrepreneur and the entrepreneurial intention. This area of research has ancient roots, as, for example, one of the first definitions of entrepreneurship can be attributed to Richard Cantillon (circa 1730), who already emphasized the risk-taking behaviour that characterizes this career path. Centuries later, a pivotal shift in the field took place thanks to the work of Schumpeter and his famous theories of creative destruction (Schumpeter and Opie, 1934). Two of the most influential definitions of entrepreneurship will be reviewed briefly, in order to set the base for the subsequent discussion and in particular to highlight some fundamental characteristics that will be under study during the analysis.

### **The two main definitions of entrepreneurship**

The milestone definition issued by Schumpeter sees the entrepreneur as an innovator who implements a change within one or more markets. This can be achieved through various means, such as the introduction of a new or improved good or service, or through an indirect innovation, for example affecting the methods of production (e.g. redefinition of the fundamental supply chain or sources of assets) or delivery. Moreover, the author highlights that *“The entrepreneur–innovator’s motivation includes such aspects as the dream to found a private kingdom, the will to conquer and to succeed for the sake of success itself, and the joy of creating and getting things done.”*, thus putting a strong emphasis on the motivations that bring a person to undertake this career path. Summarizing, this definition gives the opportunity to extract two main elements, the innovative input and the personal drive.

However, the definition remained subject to new and different denotations. Shapero (1975) had brought another important contribution through his definition: *“[...] entrepreneur takes initiative, organizes some social and economic mechanisms, and accepts risks of failure”*. Through this definition we can extract further layers of analysis in two fundamental elements. First, a social dimension, which encompasses the implications of the technical changes highlighted by Schumpeter on the people within the reach of those changes. Indeed, under any innovation there is an underlying social factor, which affects the innovation itself and gets affected by it. This element helps to remind the importance of the context in which an innovation occurs. Second, he talks about failure and risk. These elements address the

human side of entrepreneurship, by highlighting that, by launching a venture, a choice is made by the entrepreneur through a decision-making process influenced by various elements. The entrepreneur essentially weights the potential benefits and the potential losses.

In sum, the framework that can be extracted by the two definitions can be summarized as follows. The choice and process of launching a new venture has personal and external factors, or more accurately, both endogenous and exogenous variables that are present. On top of this differentiation, there is a further categorization possible, on technical and social elements. This is the framework on which the analysis of this thesis is based on.

### **New forms of entrepreneurship**

Despite the great amount of literature on the topic, no single convention has been established on the definition of an entrepreneur. On the contrary, new related definitions have risen in the academic and professional worlds. One example, which is rather common nowadays, is the so called “*intrapreneur*”.

The definition of an intrapreneur is an individual that acts and behaves like an entrepreneur while working within an established organization. When looking at the above-mentioned definitions, an intrapreneur would fit them all to an almost complete extent. Thus, one could note that if the aim is to study the entrepreneurial intention, then also studying intrapreneurs would fit the purpose. However, intrapreneurs were not included within the scope of analysis as they indeed differentiate with respect to the entrepreneur, despite acknowledging that the boundaries are blurred. In fact, it is quite difficult to establish clearly what an “entrepreneurial” behaviour really means, let alone measure it. Thus, a direct comparison would be potentially misleading, as on one side we have a clear set of actions that signal an entrepreneurial intent, which follows the definitions cited above (e.g. risk-taking behaviour by capital commitments), while on the other we do not.

This inappropriateness of comparison is true especially due to one major difference between the two set of people: incentives. As argued by Scott Kirsner in his Harvard Business Review article (2018) they fundamentally differ, among other elements, with respect to the upside potential, the failure-related risks, the difference in environment in which they operate and the level of persistence. While these two latter characteristics’ fit may be subject to argument, the first two directly affect the incentive systems that influence their behaviour. Indeed, these elements have an extremely strong impact that cannot be disregarded and that

relate to the human side of the entrepreneurial activity.

Another relatively newly defined category of entrepreneur is the social entrepreneur, which is tied to the emergence of the social enterprises during the last years (Battilana and Lee, 2012). They differentiate with respect to the traditional definition of entrepreneurial venture by their mission, which has a strong and clearly stated social component, the source of financial sustainability, which includes both revenues and donations, and its role in society, being dually focused on social value and economic wealth generation, being a hybrid between a non-profit and a for-profit.

### **The presentation of the subjects under analysis**

While acknowledging the difficulty in pinpointing a clear definition of an entrepreneur, especially due to the rise of so many facets in the field, in this research there will be a focus on market entrants, in accordance with a common convention. However, it is worth mentioning that one could argue that the character of the entrepreneur has not strictly set boundaries and that the elements that constitute it are potentially flexible, as for example nor age or size of the venture is an ultimately defining element (van Praag and Versloot, 2007). Moreover, I will focus on entrepreneurs that are engaged in innovative sectors or that propose a particularly innovative solution on the market. The choice of focusing on those that deal with a high level of innovativeness is due to the higher emphasis in these cases on the risk-taking behaviour. Indeed, their context brings to the extreme case the acceptance of a risk of failure. Either their conceived business models or products/services are new, most likely at least in part unprecedented and thus characterized by many risks and unknowns.

In integration to the perception of the obstacles related to a career in entrepreneurship, I will also cover some aspects related to some elements that could mitigate the limitations faced. I will specifically refer to incubators and the founders' team composition, as major external influences.

While a great level of academic effort has been put to delineate the characteristics that commonly define an entrepreneur, I believe it is important also to study their perceptions taken from their own perspective rather than focusing only on observable characteristics. More in particular, the specific field of study concerning the behavioural determinants and motivations of entrepreneurs is a remarkably challenging and multifaceted. As detailed further below, I think that the entrepreneurial propensity is deeply influenced by one's background, and thus I will focus my attention on this aspect.

## **Academic and managerial relevance**

Many start-ups and new ventures had shown to have a strong impact on the economic activity, which can be extremely relevant and, in some cases, up to the point of redefining industry standards (Weinberger, 2018). Thus, studying the entrepreneurial intention becomes crucial to grasp the complex dynamics characterizing this process. Indeed, by defining a clear picture we may understand the causes of the rise and fall of new ventures, this latter phenomenon being widespread as noted in the paper “*Why do Most Firms Die Young?*” (Cressy, 2006). The rate of failures is indeed high, with examples of data showing 75% death rate in 10 years (“*Entrepreneurship and the U.S. Economy*”, 2018).

This is particularly true in this period, characterized by high level of unemployment in a relatively significant amount of countries, especially regarding youth (see exhibit A). This represents a severe issue, to which entrepreneurship can be an alleviating factor (Birch, 1979). Another potential positive effect of better entrepreneurship is on developing countries (Kempner, 2017), by creating virtuous dynamics of new companies and employment generation. It is widely established that innovative entrepreneurs can bring great value to the whole economy (Solow, 1956), and at broader terms they play a key role in generating innovations (Acs and Audretsch, 2005).

The phenomenon of widespread and effective entrepreneurship can reach such a large scale that may affect the overall competitiveness, sustainability and strength of an entire national economy. The leading example of Israel can be taken as a reference. As described in the book “*Start-up Nation: The Story of Israel's Economic Miracle*” (Senor, Singer & Peres, 2011), despite the relative young age of the state, its small population and limited amount of raw resources and materials, the propulsion generated by the entrepreneurial drive within the population greatly enhanced its economy. Indeed, the famous NASDAQ index is populated by many tech companies founded in Israel (“NASDAQ - Non US companies”, 2018).

Especially in these years, many waves of innovations and new business models are re-shaping and disrupting the economic landscape. It is such a vibrant period that there is even a definition to group some of these major changes: industry 4.0 (Marr, 2018). This allows entrepreneurs to exploit the potential offered by these changes, and leverage the economic momentum in order to establish themselves in the market (see Exhibit B to see the graph of Bloomberg’s U.S. start-ups barometer from 2007 until February 2018).

If there is so much potential, why then just a relatively tiny percentage of the population undertakes this type of career? Indeed, only 8.1% of the adult population in Europe is in the process of starting a business or has started a business in the last 42 months. Moreover, only roughly 29% of them are characterised by a focus on innovations (*"GEM 2017 / 2018 global report"*, 2018).

By understanding what obstacles are perceived and encountered, we can identify potential biases and incorrect expectations that may hinder the undertaking of such a career (*"Entrepreneurs anonymous"*, 2017). This may have profound implications in terms of education and knowledge diffusion. In fact, by diminishing the incorrect expectations of potential entrepreneurs, for example by providing relevant data and information, we can have a double beneficial effect. First, this change may allow improving the information available to the pool of potential entrepreneur candidates regarding the founding of a new venture. Hence, we may expect a better self-selection process, that is, the candidates who are the most fitting with respect to this particular career would improve their chance of ending up pursuing it, while on the other hand, those who are relatively less fitting would reduce theirs. This would improve the overall efficient allocation of human capital in the market with consequent potential positive economic outcomes. Second, those who choose this career would be already informed of the most critical aspects to be aware of. This could potentially avoid costly mistakes or incorrect focuses.

### **Problem statement**

The entrepreneurial intention has often been studied in various terms, especially on attempts on profiling a typical entrepreneur (more details in the literature review section). I will try to focus particularly on the academic background of entrepreneurs, and see if it influences the expectations regarding the obstacles to be faced in becoming entrepreneurs, and if there are differences also with respect to the perception on the obstacles met. Much emphasis has been placed on trying to pinpoint certain characteristics that define a "typical entrepreneur" and that can predict a career in entrepreneurship. My focus will be different, as I will directly enquire the entrepreneurs' perceptions, and not limit the research on visible characteristics and behaviours.

More in detail, I will focus on two categories of people, those with a business background (a definition that includes economics, management, finance, marketing etc.) and those with a STEM background (which comprehends engineers, physicists, chemists etc.).

Indeed, these two broad categories of subjects are the academic areas from which most entrepreneurs come, and are thus to be considered as representative of the population of entrepreneurs. For example, two thirds of innovative entrepreneurs in Italy had a business background while the remainder a technical one ("*Ecosistema Italia 2015: l'innovazione in un'infografica | StartupItalia!*", 2015).

The entrepreneurs' academic path may instil a specific framework, point of view, approach and organization of priorities. This difference may have implications on both the entrepreneurial intention and after the launch of a new venture. The link between education and entrepreneurial intent has already been highlighted in the literature (Gavron, 1998), (Audretsch, 2012).

### **Research questions and expected findings**

The research question can be defined as such:

*Are there differences between business and STEM alumni in the perception of both expected (pre-launch of the start-up) and encountered obstacles (post-launch of the start-up), in undertaking the entrepreneurial career in innovative sectors?*

My main hypothesis is that there are, as business and STEM alumni start with different assumptions and expectations regarding two fundamental elements, at an exogenous and endogenous level. First, both their priorities and their perceived personal endowment differ, in particular with respect to what is needed in terms of skills and resources for a successful start-up. Second, their assumptions regarding the level and the severity of the impact by external elements on the creation and development of the venture are different.

More in detail, I believe that these two set of people will regard differently two elements that are fundamental to launch an innovative venture, the soft skills and the technical aspects. Indeed, each set is more versed and educated than the other in one of the two elements. I expect that their respective lack of knowledge will make the two parties keener in indicating different aspects related to the founding of a venture as more hazardous and difficult to overcome. This means that, given a certain academic background, people experience the undertaking of a career in entrepreneurship differently.

I will now list the differences that I expect to find from the analysis. STEM alumni overlook relatively more the "soft" side of starting a venture. Their technical focus ("hard skills") will make them focus less on the relational dimensions, such as the importance of

having a strong network or the team building process, or the emphasis on communicating effectively their idea. They may know better how to estimate the technical feasibility of a product or process, but may not estimate as well as their counterparts the economic ways of exploitation. This may lead to overconfidence if they perceive their product/service as technically superior, while neglecting the “soft skills” side.

Business students instead are on average less capable of estimating technical risks and costs, while being more prone on focusing on the soft skills and relational side. This because education path leads them to do so and they are relatively more experienced in dealing with such matters. For example, business courses often entail some presentations and most business schools offer communication and negotiation courses.

This potential overarching and idiosyncratic difference, derived from their background, will also be tested and checked for confirmations in this study through the analysis of students’ answers, in a separate survey. The problem statement can be broken down into three main hypotheses:

*H1 - Business and STEM alumni perceive different expected obstacles pre-foundation (i.e. before the launch of the venture) on 9 main dimensions (that are listed in the methodology and data description section, such as building a strong team, obtaining funding etc). That is, before the launch of their start-ups, due to their difference in background, they differ in the expected level of potential impact derived from a set of adverse issues, both endogenous and exogenous.*

*H2 - Business and STEM alumni perceive differently encountered obstacles post-foundation (i.e. after the launch of the venture) on the same 9 main dimensions mentioned in H1. That is, once they have launched their ventures, due to their difference in background, they perceive different levels of impact derived from a set of adverse issues, both endogenous and exogenous.*

*H3 - Business and STEM alumni perceive a different level of mitigation with respect to the issues presented, derived by either team composition or activities in an incubator. That is, both categories perceive and recognise a dissimilar level of contribution that fills the gap that they have in terms of skills and experiences. This contribution is granted, when applicable, either by their colleagues/co-founders that have a different background or by the activities undertaken within an incubator.*

The first two hypotheses allow to understand whether there are indeed consistent differences in perceived expected as well as encountered obstacles (respectively pre and post the launch of the start-up), which are derived from the difference in academic background. The third hypothesis will try to uncover whether these differences are perceived as partly mediated, for both categories, by external influences such as other co-founders with different backgrounds or by experiences in incubators. Indeed, these elements could provide different points of view and build complementary skills with respect to those already possessed by the target entrepreneur. The results of this study have highlighted that H1 has been disconfirmed, as students present a solid homogeneous set of answers. On the other hand, H2 and in particular H3 have been confirmed at a statistically significant level. The differences appear to be most radical before the launch of the venture, and there is a strong evidence regarding the varying effects that the mediating factors have on the types of entrepreneurs.

It is worth noticing that there are some entrepreneurs having a mixed academic background. They have been accounted for, as they provide valuable insights as special cases. Indeed, having a hybrid academic background, they may be endowed with the best range of skills and points of view to tackle effectively a career in entrepreneurship. Indeed, differences were also registered through their answers.

## **Literature review**

I will present the main topics that influence the entrepreneurial behaviour and its perception and that were incorporated in the empirical analysis.

### **The entrepreneurial intention**

The character of the entrepreneur is multifaceted and complex in nature, since entrepreneurship is a multifaceted phenomenon and not a single defined business function. Indeed, there is no single fitting profile and nobody is born as entrepreneur, being a process rather than a stand-alone quality. There are however certain dimensions that affect this process and influence the entrepreneurs' heterogeneous activities, that happen at different levels (such as idea formation, funding gathering *et cetera*). The most widespread traits and cognitive feature that are propaedeutic to become an entrepreneur are related to the willingness to achieve, the risk and ambiguity tolerance, an internal locus of control, the perception of self-efficacy and the keenness on putting objectives (Shane, Locke & Collins, 2003). Researches focused on the codified "Big Five" behavioural predispositions (Costa & McCrae 1985), trying to link it to venture survival rate. Conscientiousness was found significant, while surprisingly a negative relationship was found with the openness predisposition (Ciavarella, Buchholtz, Riordan, Gatewood & Stokes, 2004), and the remainder were found as not correlated.

A psychological dimension that influenced much the studies on entrepreneurship regards the self-efficacy. Despite being susceptible to changes during the experience, it has been regarded as an important factor to consider. Although no clear direct relationship with venture success is firmly recognized (Baum & Locke, 2004), the research on its fundamental roots may bring more clear conclusions on self-efficacy's role in the entrepreneurial process.

More directly in terms of entrepreneurial intention, there are still gaps to be filled (Fayolle & Liñán, 2014). However, this research field has been widely scrutinized in order to find potential predictors for venture initiations (Krueger & Carsrud, 1993) based on attitudes, behaviour and the influence of the social environment. Regarding this latter component, cross-countries studies are particularly useful to understand the impact of the social stigma related to failure on the entrepreneurial intentions (Autio, H. Keeley, Klofsten, G. C. Parker & Hay, 2001). A remarkable effort, in terms of gauging the entrepreneurial intentions, have been conducted by the Panel Study of Entrepreneurial Dynamics (PSED - *The University of Michigan*", 2018), which collects data, among other types, related to the motivations to launch

a venture. Further studies tried to narrow down the potential reasons for the choice of such a career path to fewer options, to get an understanding of the most relevant trends, and in this particularly cited paper there are six: “*self-realization, financial success, roles, innovation, recognition, and independence*” (Carter, Gartner, Shaver & Gatewood, 2003). Interestingly, despite the diversity of the ventures founded, one of the consistently mentioned reason along the financial one is the social recognition (Cassar, 2007). In terms of education, both the least and most educated set of people have higher rates of entrepreneurship (Blanchflower, 2000).

Another important element to be considered is the opportunity identification. Entrepreneurs, especially in innovative sectors, must be able to individuate and assess an opportunity to enter effectively into the market. However, despite being so intuitively important, it has been rather difficult to study it in a comprehensive way (Gaglio & Katz, 2001). As a further complication, the next step in the process, the process of the undertaking, has also recently being subject to debate (Palich & Ray Bagby, 1995). In terms of risk-taking for example, studies suggest that rather than more risk-takers, entrepreneurs categorize ambiguous business scenarios more positively. It has emerged that much of this process has to do with frameworks and the personal assessment of opportunities and threats.

While it has been established that entrepreneurial education affect the entrepreneurial orientation, little is known of the exact contextual dynamics, especially when business and STEM students are confronted (Maresch et al., 2016), (Zhang, Duysters and Cloodt, 2013).

### **The human capital success factors**

The next step is to inquire who has success among those that launch a venture. More in detail, the intent is once again to pinpoint the characteristics and the trends that could help individuate the most widespread success factors. In this sense, there are endogenous and exogenous forces that might shape the eventual outcome. Among the endogenous, i.e. those elements that are embedded in the entrepreneur, there are both innate (e.g. gender) and developed characteristics (e.g. education). The exogenous ones, instead, are derived by the context and environments in which the entrepreneur operates.

One of the most influential elements among the endogenous variables is education. Interestingly, through a literature review a trend was noticed, in which education had no impact on entry but it has an impact with respect to performance (Van Der Sluis, Van Praag & Vijverberg, 2008). Another element is the presence of an entrepreneurial background in the family (Dunn & Holtz-Eakin, 2000). Indeed, there is a higher tendency from those who have

members in their family to be entrepreneur themselves. This affects through their financial possibilities and, more importantly, through their experiences and results.

Regarding the finances of entrepreneurs specifically, the heterogeneity in cases, contexts and situations make it difficult to have a clear trend (Hurst and Lusardi 2004). However, the relationships seem to remain flat for most of the distribution, while phenomenon like liquidity constraints may still be present and elements such as inheritance may have an alleviating outcome (Holtz-Eakin, Joulfaian & Rosen, 1994). One of the most impactful element in the early stages is the prior entrepreneurial experience (Stuart & Abetti, 1990).

### **Technical versus soft skills in the start-up environment**

As seen in the introduction, the entry of innovative firms has a positive effect in terms of innovations, especially in sectors near the technology frontiers (Aghion, Blundell, Griffith, Howitt & Prantl, 2009). The venture's human capital is essential to its success, regarding both the founding members and the first employees (Rocha, Vera & van Praag, Mirjam C. & Folta, Timothy B. & Carneiro, Anabela, 2016).

One of the few papers that studies the impact of technical and soft skills in early stage ventures has the research purpose to see if there is complementarity between them (Mueller & Murmann, 2016). The sample is drawn from German start-ups, with data derived from the German Federal Employment Agency. Their results show how teams with mixed skills are more likely to introduce innovations in the market. Interestingly, their findings apply only when the founder has technical skills and then hires business alumni. Indeed, this result does not even apply when the two sets of skills belong to the founder nor when the founding team is mixed. This is explained by the diminished costs related to deciding a joint strategy. Moreover, another suggestion regards the imbalances in terms of knowledge, since entrepreneurs with STEM background are more business savvy with respect to how much business alumni are tech experts. In addition, they find that founders with a technical background do not often hire business alumni.

The balance of skills has been reviewed and it is widely established that entrepreneurs must be jack-of-all-trades, or in other word, must be able to face different challenges effectively (Lazear, 2004). To do so, it requires having several skills, which may be grouped into categories, for example in soft and technical skills as it is the case in this study.

## **The demographic variables**

The most relevant element among the demographic variables is gender. In fact, there is a substantial gender gap that persists between countries regarding entrepreneurship. The effects are multifaceted, as fewer ventures are launched by women (6 for every 10 male entrepreneurs, "*GEM Global Entrepreneurship Monitor*", 2018), and they are usually characterized by lower levels of performance (Jennings & Brush, 2013). This phenomenon has its roots in the self-perception that is widespread in many cultural contexts, regarding skills, capabilities and role of the woman in society. This is fuelled also by the imaginary that links entrepreneurship to a prevalently male activity (Gupta, Turban, Wasti & Sikdar, 2009). Moreover, the gender gap in the STEM subjects also has an indirect effect on the entrepreneurial intention of women. While there seems to be no bias in terms of debt financing (Buttner & Rosen, 1989), there seems to be a negative effect on equity financing.

Age's effect on entrepreneurship is still controversial ("*Entrepreneurs Get Better with Age*", 2013). The widespread convention is that each generation has its own idiosyncrasies with respect to entrepreneurship, combined to the effect brought by the stage of life in which each generation is at a given time. Millennials in particular possess some characteristics, such as above average IT skills and relative better education, that would lead to strong and sustained entrepreneurial activities ("*State of Entrepreneurship: Mixed Indicators Prompt Call for Entrepreneurial Renewal*", 2015). Moreover, there is empirical evidence of the relatively easier capacity to adapt to new information (Parker, 2006). However, factors such as debt burdens and adverse economic conditions (e.g. the financial crisis of 2008) negatively influenced the rate of start-up foundations. This generation has nevertheless not entered the peak age (40 years) and it is expected then to see an increase in its rate. On the other hand, older generations can rely on broader experience, larger networks and more consistent financial resource (Weber & Schaper, 2004). It is highlighted in the GEM report that entrepreneurs aged from 25 to 44 are the most active entrepreneurs. Moreover, in the U.S. tech companies are founded by middle-aged entrepreneurs, despite the most famous cases involving the foundations of Microsoft and Apple at a relatively early age (Wadhwa, Freeman & Rissing, 2008). In addition, in this latter study, it is noticeable that the majority held bachelor degrees (92%), while 31% held a master degree and only 10% hold a PhD. Half of these were in STEM subjects and one third in business, which mirrors the situation in Italy, both in terms of education and other demographics. Returning to the age dimension, there are quite a few pieces of evidence that indicate that start-ups founded by middle age entrepreneurs achieve

faster growth (Henley, 2005), (Brüderl & Preisendörfer, 2000).

For the sake of brevity, matters regarding the background of entrepreneurs in terms of ethnicity and culture are not covered in detail. Nevertheless, it is worth mentioning that cultural aspects have profound impact on the entrepreneurial orientation and the socio-economic context in which new ventures operate (e.g. immigration forces that are highly correlated with entrepreneurial activities) (Lee & Peterson, 2000) (Mueller & Thomas, 2001).

### **The role of networks and incubators**

In terms of networks, it has been established that the early stage dynamics are fundamental to the firms' performance (Eisenhardt & Schoonhoven, 1990). In particular, the team composition and its set of experiences has an impact in terms of venture strategy, as for example to focus on exploitation or exploration (Beckman, 2006). Indeed, the myth of the lone entrepreneur has been abandoned, while no clear relationship between team heterogeneity and performance has been found (Klotz, Hmieleski, Bradley & Busenitz, 2013).

Incubators and accelerators contribute to the development of new ventures. In the world there are widespread and established organizations carrying these types of activities ("*Seed-DB | List of individual Seed Accelerator programs*", 2018) ("*Organizations | Crunchbase*", 2018). The role and impact of incubators has been long studied. It is interesting to notice that it has been mentioned that the degree of technical focus of the product/service of the venture has an influence in terms of outcomes for start-ups that go through an incubator (Cooper, 1985). However, it is difficult to pinpoint the activities of an incubator, due to the wide range of processes and specifics that are possible (Aernoudt, 2004).

### **The obstacles towards entrepreneurship**

Regarding the obstacles, some datasets on the topic gather these sorts of data, however in a very heterogeneous way ("*The 9th Annual State of Entrepreneurship Address*", 2018). Few studies highlighted the sources of fear and failure of new ventures (Cacciotti, Hayton, Mitchell & Giazitzoglu, 2016) (Cacciotti, Hayton, Mitchell & Allen, 2015). As noted in this latter paper, fears and obstacles can both inhibit and motivate entrepreneurs. The authors' efforts are towards unifying the framework regarding the fears and obstacles faced by entrepreneurs, and will be used as a guideline to define the basis for the empirical research.

## **Methodology and data description**

The analysis has been carried out only through primary data collected by means of two main surveys (please refer to appendices 1 and 2), which will be used for both descriptive and inferential purposes. The choice of the survey method has been driven by the necessity of tackling the variety in the samples under analysis. Indeed, while an interview might have provided with more in-depth insights, it lacks the standardised format of information that provides for direct comparability, which is essential for the purposes of this study. The information collected will be both qualitative and quantitative. These latter will be gathered through 7-points Likert scales. The advantage of this process is that I gathered data that precisely fit my research question, and this is a fundamental feature since I am also inquiring very narrow and specific personal perceptions that have not yet been studied in-depth. Both endogenous and exogenous variables were considered, as well as hard and soft skills related ones. The survey is an effective method since what it is looked for is the perception of the person, and thus the matter of subjectivity is not a bias, but instead exactly what I want to study and it is therefore rightly incorporated. One comparable example is provided by a similar study in terms of methodology and relative scope regarding perceptions: “Kitchen confidential? Norms for the use of transferred knowledge in gourmet cuisine” (Di Stefano, King & Verona, 2013).

These perceptions have been gathered in two manners. First, through an open question, that allowed respondents to express themselves without any bias or guidance derived by the proposed closed items. It has been included because it addresses specifically the lack of in-depth and freedom of expression that lie beyond the closed items which are typically asked in a survey. Thus, this kind of question has always been asked at the very beginning of the respective surveys. Secondly, the remaining sections comprised closed items that allowed for a greater level of comparability between respondents on defined topics.

However, it is to acknowledge that the potential sample will be limited using this approach, if compared to analysing secondary data provided by established organizations. All the surveys’ data were gathered with total anonymity of the respondents. This feature contributes to a high level of honesty and avoidance of biases with respect to the answers provided.

The surveys have been handed out on a web format through the well-known Qualtrics platform, and the data gathered has been subsequently analysed using IBM’s SPSS statistical software. The respondents have been personally contacted through means of social networks,

namely Facebook and LinkedIn, given the characteristics showed through their profile (e.g. type of employment). They have been informed of the aim and scope of the survey and its modalities, and then provided with the relevant link in case of agreement to contribute with their opinion. This personal contact and approach has ensured that the respondents were exactly the persons having the required background which is within the scope of the analysis, and that only those people were provided with the access to their respective surveys.

Regarding the entrepreneurs, a first set was found and targeted through incubators platforms and websites. Namely, founders of start-ups operating in the *Start-up Lisboa* and *Start-up Braga* incubators were contacted (see the section regarding the web resources for the relevant links). These incubators have been chosen for their national reach and established recognition and to permit cross-culture validations' type of analysis. Moreover, they represented an optimal choice since they host start-ups with a heterogeneous variety of backgrounds and fields of operation. Indeed, by focusing on more narrowly focused incubators, for example hosting start-ups developing only maritime technologies and solutions, there would have been a potential bias and distorted representation of the overall start-up scene. The second set was provided by researching entrepreneurs that were graduated from two of the most prestigious universities in Italy, which are the Politecnico di Milano and Bocconi University.

Regarding the data collection from students, the survey has been shared through the Facebook social media, by contacting those students belonging to closed Facebook groups of their respective courses, either official (see the section regarding the web resources for some examples of relevant links) in their nature or not. Now that the methodology of distribution of the surveys has been covered, the next section will highlight their contents.

### **Overall description of the first survey**

The first survey has been distributed among current university students of both business and engineering university programs (namely from the following universities: Bocconi, Católica Lisbon School of Business & Economics and Polytechnic University of Milan), ranging from the second year of bachelor up to the last year of master. This survey had three main goals. Firstly, to analyse and understand the main obstacles students perceive with respect to the entrepreneurial career and their overall entrepreneurial orientation. Secondly, to see whether business and STEM students' perceptions present consistent differences, again also in terms of their entrepreneurial intention. Finally, this survey also had the function to adjust the

questions to be asked to current or recent ex-entrepreneurs, which is the target sample of the second survey, in an exploratory approach.

### **Overall description of the second survey**

The second survey will measure the very same perception on the obstacles related to entrepreneurship proposed in the first survey, but this time with the addition of a temporal dimension. More in detail, the second questionnaire asks about the entrepreneurs' expected severity regarding a certain set of issues both before the launch of the venture, and the level of severity of these same when they were encountered, i.e. post launch. By doing this, it is possible to rank the perceived obstacles and put them into macro-categories of severity.

In this way, the entrepreneurs (who, by definition, have shown a strong entrepreneurial tendency by choosing this peculiar career option), disclose both what they expected to face and what they actually encountered along their experience. This allows also to understand how much of their expectations were correct, in addition to whether there is a consistent difference among the two sets of alumni in terms of expected and encountered obstacles. Moreover, the survey asks to evaluate, when applicable, the perceived impact on skills mediation (which refers to H3 described above) derived by the influence of either colleagues with different backgrounds or by the influence of an experience in an incubator program. Lastly, demographics have also been collected, to deepen the overall analysis and provide a holistic understanding of the sample under study. For this category segment, a wider range in terms of age was expected, since becoming entrepreneur is traditionally less age-bounded relatively to undergoing higher education.

It is worth noticing that I decided not to include in the analysis also early joiners (i.e. non-founders) for two reasons. First, because they have different incentives in terms of personal economic gain and achievement. Indeed, founding a venture has deep implications in terms of commitment and economic risks. Nevertheless, one could argue that early joiners could negotiate a deal that includes a stake in the company. However, there is a second reason that led me to exclude this category, that is, they would not experience the same problems and issues with respect to the founders. They most likely would join a company at least partly defined, in which time and economic resources have been already expended, and where many adjustments and solutions have been already applied. Some issues may not even be present anymore (e.g. the founding and bootstrapping money being already secured). This strong element of difference does not allow making appropriate comparisons with respect to the

perceived obstacles, especially when the analysis touches the perceptions at the pre-launch phase.

For a detailed breakdown and analysis of each item of the two surveys, please refer to appendix 3. Please refer to appendix 4 for the description of the complementary tools used in the analysis.

Regarding the choice of statistical analysis, since the objective was to find evidence of quantitative differences within the responses given some categorical variables (i.e. background and type of activity presently carried out), the ANOVA set of techniques was defined as the most suitable. In particular, the ANCOVA technique was chosen in order to conduct the analysis, given its feature of being able to take into account covariates that may have an influence on the relationship between the dependent and independent variables. This helps to reduce the error variance, eliminate the disturbance of confounding variables and thus achieve an overall lower level of bias. On the other hand, inserting these controls also diminishes the risk of suffering from an omitted variable bias. In the analysis and exhibit sections, only statistically significant and most important results are shown for the sake of conciseness. Moreover, all ANCOVA analysis were manipulated as to obtain the highest level of adjusted  $R^2$  possible, excluding all the non-relevant covariates, while taking care that the parameter of the main independent variable is not significantly impacted. A common statistical threshold of  $p=0.05$  was adopted to evaluate the magnitude of the statistical significance. Regarding the assumptions, the dependent variables are always measured on a continuous scale. The independent variables are two or more categorical and independent groups and the observations are independent one on the other. Since the scales are bounded there is no outlier that could bias the analysis. Moreover, residuals are normally distributed for each category of the independent variable. In addition, the covariates are assumed to be linearly related to the dependent variable at each level of the independent variable. Homogeneity of regression slopes are also assumed. Scatterplots of residuals were analysed to check for any abnormal behaviour. Homogeneity of variance is tested through the Levene's test as well as homoscedasticity that is tested through the scatterplot of expected and observed standardized residuals. Other linear regressions were used to support the analysis, such as in the case of the scenario analysis. Regarding the qualitative responses, the above-mentioned algorithm was used to conduct a text analysis.

## **Statistical analysis and empirical findings**

In this section the information gathered from the surveys is reviewed, and their elaboration to draw the most relevant outcomes, which will be the basis for the following discussion section. Thus, I will describe also the formal empirical procedures and statistical analysis used to draw these conclusions. Moreover, I will highlight the differences following the comparison tool for the analysis cited in the methodology section, i.e., formulating cross category comparisons between all the proposed category subdivisions.

### **The results from the first survey**

The number of full respondents to the first survey has been of 126 students. Details in terms of the demographics can be found at Exhibit 2.

### **The text analysis**

A first useful step is to evaluate through descriptive statistics the most evident findings. In particular, the qualitative section can already grant us some useful hints to guide the analysis. As mentioned in the methodology section, to study this set of answers, a text analysis algorithm has been used on the open question submitted to students. The analysis allowed to understand what were the most cited obstacles by STEM and business alumni. This has been determined by considering the relative frequency of citation (expressed in percentage) with respect to the total number of respondents per category of background. Some evident trends emerged, which will be now described. Please refer to exhibit 3.

The first interesting element is to notice that, between students having different backgrounds, there is some sort of homogeneous and coherent evaluation. Indeed, in relative (percentage) terms the frequency of obstacles cited do not vary apart from just three exceptions. For example, for both categories of students, the funding obstacle was cited the most (46% of frequency for business and economics students, 42% for engineering students). This is by far the clearly most felt obstacle, as it detaches itself by 10% points in both categories from the respective second most cited obstacles. Then, a second set of obstacles clearly stands out for both categories of students. The first obstacle comprised in this set regards the external economic environment (30% for business and economics students, 25% for engineering). This comprehends the market uncertainties, the presence of competitors, the changing customer preferences and all the exogenous elements that determine a negative landscape to launch a

venture. Related to this obstacle, a second one comprehended in the same set is the potential loss of personal economic stability and other personal constraints, such as the hardship in forming a family while managing a start-up. The third obstacle is the risk aversion behaviour (28% for business students, 22% for engineering students). This comprehends the potential lack of courage or belief in one's own skills and capabilities or even a sheer lack of courage. It is interesting to notice that two of the top cited obstacles are strictly related to the personal aspect of launching a venture, instead of being related to the technical aspects.

A third set of obstacles (whose percentage is stable above 10%) comprises three obstacles. The first one is the bureaucracy involved. This encompasses the pressure exerted by the necessity to comply with complex legal environments, fill the amount of bureaucracy, red tape etc. The second one relates to the lack of adequate education or experience to launch a successful venture (10% for business students, 17% for engineering students). The third obstacle is related to the hardship in finding the right idea. This encompasses the level of novelty of the idea, its potential for scaling, or even just the chance of finding one which is worth pursuing (18% for business students, 14% for engineering ones).

The last set of obstacles comprises all the minor remaining ones, which do not reach a frequency of 10% in the answers of both students' categories. The first obstacle being the tax pressure and fiscal burden (9% for business students, 11% for engineering students). This is interesting to notice, as start-ups usually benefit from fiscal incentives and advantages (see the web resources section for an example referring to the Italian region of Lombardy, *"Assolombarda - Guida alle agevolazioni per le Startup innovative"*, 2018). However, it is worth noticing that this might be due to the very specific cultural contexts in which the respondents live: both Italy and Portugal have high level of taxes. The second obstacle of this set regards the difficulty in finding the founding team's members and possessing a strong and diverse network of professionals to rely on (11% for business students, 3% for engineering ones). The last one is related to the concept of culture (4% for business students, 1% for engineering students). Students described that one obstacle is overcoming the general culture which lies in the context in which they live. This means for example the approval of their family on the matter, the difficulties in breaking a more traditional career path or not feeling to be having the appropriate cultural framework to tackle such a complex endeavour.

Besides the high degree of homogeneity of responses between the two categories of

students, it is also interesting to observe that there are three major differences. The first and largest difference is about the team and network obstacle. Engineering students perceive it as much less relevant (a difference of 8%) than their counterparts. This most likely indicates a lower perceived need to complement their skills through a diverse team composition. The second largest difference is about the education and experience necessary to launch a start-up (7% of difference). In this case, engineering students signalled that this obstacle is perceived as relatively more burdensome. Lastly, also in the case of the loss of personal economic stability we see engineering students giving more weight to this obstacle (6% difference). All other differences were equal or lower than 5%, and were thus deemed as not relevant.

This qualitative part allows to set the benchmark for the subsequent analysis. Indeed, the main points found, i.e. the general level of perception among the obstacles, the general homogeneity of perception among the two student categories and their few distinct differences, will be checked through the quantitative analysis.

### **The quantitative analysis**

The quantitative part is divided into two main set of questions. The first one gives an indication of the entrepreneurial orientation. The second one has the aim to confirm the perceived severity of obstacles. Please refer to exhibit 4 for the table of the values considered in the analysis for the first set and exhibit 5 for the second one.

The first set sees again a strong level of homogeneity between the two categories of respondents. The first question, regarding the level of consideration that respondents have had with respect to a career in entrepreneurship, shows an average of 4.43 (7 being the most extreme positive answer and 1 the most negative one, which applies to also the other two questions), meaning a slightly positive response overall. Engineering's higher average and lower standard deviation signal that they indeed had taken on average more in consideration this career choice (0.18 more than their counterparts). On a similar trend, this is also confirmed by their answers to the third question, which asks whether they would prefer to be entrepreneurs or employees. Here again the average is quite high (4.94 with 1.78 of standard deviation) and engineers signal a higher preference with a slightly lower standard deviation. This means that overall, this type of career prospect is seen quite positively by both categories of students and it is felt as preferable to the standard condition of employment. However, the second question, regarding

the level of information gathered on pursuing this career, shows a considerably overall lower result. Indeed, the general average is of 3.37, which means a slightly negative response. In this case, students of business showed a greater average value (3.44, distancing by 0.28 the value of the engineering students of 3.17). This lower value was expected since it represents a further step towards the pursue of this career choice. It is worth noticing that the higher value given by business students may be partly explained by the potential related content studied in some specific courses dealing with entrepreneurship.

The second set of questions allows us to define the relative severity of certain predefined obstacles. As in the former case, the most evident finding is the homogeneity of the responses among the two categories of students. Indeed, in terms of their ranking regarding the perceived severity of the nine obstacles, there is no difference. We can summarize the levels with three groups of obstacles. The first group includes the two obstacles with the highest average, of which the first one is related to the obtainment of funds (average of 5.64) and the second one to the risk of losing personal economic stability (average of 5.56), both with a relatively low standard deviation with respect to the answers provided by the two groups. The second groups of questions is formed by three obstacles, namely the *“The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture”*, *“Estimating the technical feasibility of the product/service”* and *“Building a team and having a professional network”*. Their averages all fall within a narrow range (4.67, 4.72 and 4.77 respectively). Regarding the standard deviations, they are generally stable and homogeneous except the one related to the estimation of the technical feasibility for the engineering students (value of 1.78) while on the contrary it is very low for the business students (value of 1.39). This may be due to the relatively heterogeneity of major of the respondents, where some are potentially more inclined in educating hard knowledge that may be relatively more easily applied to evaluate innovative products or services (for example, a student of software engineering may be endowed with skills that better apply to the estimation of ideas that may become the basis for the launch of a start-up, rather than a civil engineer).

The third set of obstacles comprises all the remaining four, which are the least felt, namely the *“The social stigma related to failure”*, *“Potential personal constraints (e.g. expected effort and time dedication requested higher than average)”*, *“The nicheness of the entrepreneurial career and the availability of other career options”*, *“The perception of one's own abilities and traits (among which, for example, the risk-taking behaviour) as not matching*

*those of a potential entrepreneur*". Their averages fall between the values of 3.74 and 4.31, respectively 3.77, 4.01, 3.74, 4.31. About their standard deviations, there are only two notable cases. First, the one related to the potential personal constraints for engineering students (value of 1.83). Secondly, the one related to the social stigma related to a potential failure (value of 1.75). Indeed, these are extremely personal obstacles and it could be expected to see more variability in terms of responses.

We can now examine more closely the differences between the two categories of students. There are three major values that vary in a considerable way. Namely, these are: *"The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture (and the potential related rewards)"*, *"The risk of losing personal economic stability"*, *"The nicheness of the entrepreneurial career and the availability of other career options"*. All of them show higher values for engineering students, meaning that they perceive them as more impactful issues. The first obstacle shows a 0.38 difference, the second a 0.27 difference and the third one a 0.33 difference.

ANCOVA analysis have been conducted to find evidence of statistically significant differences among the averages of the above cited obstacles, when considering the student category as main independent variable and all the other demographic covariates as controls.

First, a factor has been created by considering the three questions regarding the entrepreneurial orientation. The extraction method chosen is the Principal Component one. As expected, only one factor had been extracted and therefore no rotation was needed. Please refer to Exhibit 6 to 11 for the details. An exploratory ANOVA was run on this factor, considering only education background and gender. Only this latter resulted statistically significant, with a lower average for female respondents (exhibit 12). Then, ANCOVAs were run on the three obstacles that presented the widest differences but none resulted statistically significant. The only obstacle that was almost significant (sig. =.079) was the one related to the capacity to spot and estimate the economic value of an idea (exhibit 13). However, its  $R^2$  was of 3.3%, implying that even if there is systematicity, it would account for little of the variation. This was confirmed also by the results of the ANOVAs that considered only the education background as independent variable. Please refer to exhibit 14.

## **The results from the second survey**

Regarding the second survey, the number of respondents has been of 112 entrepreneurs. For a table of the demographics please refer to exhibit 15 and 16.

The subsequent part is divided into three main set of questions. The first one gives an indication of the perceived level of severity of predefined obstacles. The second one has the aim to describe the impact of mediating factors over the obstacles. The third one describes the scenario analysis. Please refer to exhibit 17 and 18 for the tables of the values considered in the analysis for the first set and exhibit 19 for the second one.

## **The comparison between business and STEM alumni entrepreneurs**

As in the case of the analysis of the students' answers, it is interesting to notice that there is a great homogeneity in the responses across the three categories of alumni. The obstacles, in this case, can be divided into three main sets.

The first one, which is formed only by the obstacle related to the obtainment of funds, since it is clearly standing out as the most severely perceived, both before and after the launch of the venture. Indeed, it reaches a value of 4.83 before and 5.23 after, with a high standard deviation in the value attributed "before" of 1.91. This latter value means that the expectations before were quite heterogeneous, and this appears plausible, since getting funds is a rather uncertain process. On the other hand, the difference among the above-cited numbers means that, not only it was already thought as the most severe issue to be confronted, but nevertheless they underestimated it.

Then a second set, which comprises most of the obstacles, include all those that were deemed as intermedium in their level of impact. These are namely: the capacity and chance of spotting and evaluating the venture, the estimation of the technical feasibility, the process of building a team and having a strong professional network, dealing with the government, the risk of losing personal economic stability, the potential personal constraints, and the market uncertainty. Their values range for the before category between 4.04 and 4.4, while for the after category between 4.14 and 4.85. The standard deviations are stable except for those regarding the variables about dealing with the government and the risk of losing personal economic

stability, especially before the launch of the start-up. Especially for this latter obstacle, it is expected some sort of heterogeneity in the responses, as the outcome could strongly depend on one's own family and financial wealth background condition. The difference in the values between before and after do not appear relevant except for two cases. The first one relates to the obstacle concerning the process of forming a team and a strong professional network. Indeed, the difference in values amounts to 0.51 (from 4.34 to 4.85), meaning that also this obstacle has been generally underestimated by the respondents. The second one relates to the obstacle concerning the process of dealing with the government, where the difference amounts to 0.47 (from 4.33 to 4.80). Here again, this obstacle seems to have been underestimated to a significant extent.

The third set of obstacles comprises only three, which were deemed as the least negatively impactful. These are namely: *“The perception of one's own abilities and traits (for example, the risk-taking behaviour) as not matching those of an entrepreneur”*, *“Lack of adequate academic preparation to begin a start-up”* and *“The social stigma related to a potential failure”*. Their values remain below 4 both before and after, more specifically remain in the range between 3.07 and 3.52 for the before category, and between 2.82 and 3.52 for the after one. Their standard deviations remain particularly high across both before and after categories, and this seems reasonable, as they all are very personal elements. Interestingly, the obstacle related to the lack of adequate academic preparation to launch a start-up not only has the lowest value, but it's the only obstacle which decreases if compared to the after category. In other words, their perception was that they underestimated the adequacy of their academic preparation to establish a start-up. Moreover, it is the only case of obstacle that was overestimated.

We can now examine more closely, by breaking down the answers, the differences between the three sets of entrepreneurs, both before and after. This allows for multiple level of analysis and comparisons. First, it is interesting to notice that the average level of severity expressed by business alumni before is 4.01 and 4.41 after, which means an overall underestimation. On the contrary, STEM alumni start with a slightly more negative expectation, with an expressed average before of 4.11, which proves to be worse than reality, as the average value of after is 3.96. Those with a mixed background follow a more similar path to their business-only counterparts, starting with a value of 3.99 and ending with a value of 4.17.

Secondly, we can break down the intra category differences, to reveal the presence of potential patterns. The standard deviations follow the general tendencies described above in the aggregate analysis, and are highly stable across categories.

Looking only at entrepreneurs with a business background, we can observe four obstacles that are characterized by a relevant change (with a magnitude bigger than 0.5) in value between before and after. These are the obstacles related to the estimation of the technical feasibility, the obtainment of funds, the process of dealing with the government and the risk of losing personal economic stability. All these variables are characterized by an underestimation, since their values after show an increase respectively of 0.53, 0.67, 1.07, 0.56. In particular, the difference regarding the process of dealing with the government shows an increase of strong magnitude. Overall, the average difference is of underestimation by 0.40.

Looking only at entrepreneurs with a STEM background, we observe instead also a different pattern. Indeed, out of the three obstacles that show a difference between the before and after values, two are overestimations. These are the obstacles related to the estimation of the technical feasibility and the capacity to spot an opportunity and evaluating its potential economic value. These show a decrease of respectively 0.62 and 0.60. On the contrary, the process of building a team and a professional network is underestimated by 0.60. It is interesting to notice that the average difference is of -0.15, which means an overall overestimation of the severity of the obstacles. Indeed, out of the 11 obstacles, 8 present negative values, or in other words were overestimated.

Taking into consideration only the entrepreneurs with a mixed background, we can observe four obstacles that show a relevant variation. These are the capacity to spot an opportunity and evaluating its potential economic value, the team building process and the creation of the professional network, the risk of losing personal economic stability and the potential personal constraints. Their respective differences are of 0.93, 1.07, -0.60 and 0.60. Only the third mentioned obstacle showed an overestimation while all the others, like in the case of business alumni, were all underestimations. All of these differences were confirmed through ANOVA analysis, with values around 10%.

At this point, it is also possible to analyse the differences between the three categories of alumni. Comparing the business and STEM alumni, we can highlight that most of the relevant

differences happen after. The only difference before regards the market and economic uncertainty, in which business alumni assign a value lower of 0.74. However, after there is no significant difference, hence the severity is levelled between the two categories. On the other hand, all obstacles except the obtainment of funds, the team and professional network building and the market and economic uncertainty, present strong differences, with values of difference ranging on average around 0.60. Moreover, there is a peak difference of 1.04 concerning the obstacle regarding the technical feasibility. These latter differences are in favour of the alumni with an STEM background, meaning that their perceived obstacles after were deemed as less impactful with respect to their business counterparts. Taking into consideration the entrepreneurs with a mixed background instead, we can observe a few patterns. With respect to the other two categories, they consistently differ on five obstacles. Namely the one regarding the evaluation of the idea, the estimation of the technical aspects, the process of dealing with the government, the risk of losing personal economic stability and one's own perception of skills and capacities to launch a venture. For the first two obstacles and the last one, their responses show a relatively lower perceived impact, especially for the first one (with a difference of 0.96 to business alumni and of 1.33 to STEM ones). In the remaining two cases, they signalled a higher perceived obstacle, with values of difference ranging from 0.81 to 1.13.

As in the analysis section regarding the students, ANCOVA analysis have been conducted to find evidence of statistically significant differences among the averages of the above-cited obstacles, when considering the academic background category as main independent variable and all the other major covariates as controls. All Levene's test for equality of variances and White test for heteroscedasticity were passed.

Between business and STEM alumni, only three obstacles were found with a statistical significant difference. The first one is the obstacle related to the market and economic uncertainty before, where the low p-value (0.003) and high parameter estimate (-.847 for business alumni) show a strong effect ( $R^2$  of 14% and adjusted one of 11.3%). At the "after" time frame, the obstacles related to the technical feasibility (sig. =.002, parameter of +1.024 for business alumni,  $R^2$  of 11.3% and adjusted one of 9.4%) and the personal constraints (sig. =.024, parameter of +.812 for business alumni,  $R^2$  of 6.3% and adjusted one of 4.3%) were found significant. Please refer to exhibit 20 to 22.

Comparing the mixed background alumni with the business only ones, the obstacles

before of the risk of losing personal economic stability, dealing with the government before and the technical feasibility after were found relevant, with p-values all below 3%. Moreover, these last two showed high level of  $R^2$  and the adjusted one (30% for the government related, with adjusted of 23.3% and 21% for the technical obstacle, with adjusted of 13.7%). The parameters were respectively of -1.404, -1.835 and +1.027. Exhibit 23 to 25.

Instead, when comparing with the STEM alumni, mixed background ones only differ in the before obstacle related to the capacity of estimating the economic value of an idea (sig. =.004, parameter of +1.209 for STEM alumni,  $R^2$  of 19.1% and adjusted one of 15.2%). Exhibit 26.

When comparing the registered severity before and after within the same category of entrepreneur, we see that the obstacles with the highest differences are almost all significant at a 10% threshold. For business alumni those were the process of dealing with the government, obtaining funds and estimating the technical feasibility. For engineers those were estimating the idea, the technical aspects and building a strong team. Finally, for mixed background alumni only the process of building a strong team and estimating the economic value of the idea. Data at exhibit 27.

### **The differences with respect to the mediating factors**

Regarding the mediating factors, all were characterized as moderately to highly positive and no value resulted below the middle point on the Likert scale. The six questions can be subdivided into three sets. The first one includes the first two questions, regarding the importance of having a strong professional network and the evaluation of the impact of having a person with a different background in the team. In both questions, the answers' values resulted higher than 5.50, with an average of roughly 5.70. The second set of questions comprises the following three. Namely, the value added brought by the person having a different background with respect to the skills lacking from the respondent, the difference in the vision and in the perceived obstacles by the same person, the impact of participating in an incubator. Their values range nearby 5.0 within a range of 0.50, with two notable exceptions that will be explained later more in-depth. The last set is formed just by one question, the value added in terms of skills that were lacking from the respondent's background brought by the experience in an incubator. Indeed, its average value is roughly of 4.0 among all categories, with all the single values within a range

of 0.50.

The differences among categories of entrepreneurs are null except in three cases. The first one highlights the business alumni's higher perceived positive impact brought by a person with a different background. Their responses show a higher average value by 0.48 with respect to their STEM counterparts. The second major difference is seen in the lower perceived contribution to their lacking skills brought by a person with a different background, expressed by entrepreneurs with a mixed background. The difference with respect the average value between business and STEM alumni is of 0.45. Finally, there is a higher perceived positive impact felt by STEM entrepreneurs when considering their experience in an incubator, signalled by a higher average value of 0.49.

The ANCOVA analysis highlighted some interesting findings. Firstly, a strong significant result (sig. =.047) signalled that STEM alumni expressed a more favourable opinion regarding the positive impact that had participating in an incubator program (beta of +.586, with respect to the business category,  $R^2$  of 20.4% and the adjusted one of 13.2%). Secondly, the question regarding the level of impact of a team member with a different academic background, also showed a consistent difference (sig. =.059). Its  $R^2$  is of 19.2% and the adjusted one of 15.2%, with an estimated beta of +.430 for business alumni with respect to STEM ones. Exhibit 28 and 29.

An analysis has been conducted to see the effect of these mediating factors within category. Unfortunately, business alumni that did not have a person in the team with a different academic background were only five, and thus it has not been possible to analyse. On the other hand, it has been possible to investigate the impact of the participation in an incubator for STEM alumni (28 who participated in an incubator and 24 who did not). Those who participated saw on average their values after the launch drop or remain at the same level as before the launch, with an average difference of -0.28, while the average value remains stable for those who did not participated (+0.01). In key obstacles, those who participated signalled an advantage with respect to those who did not (most notably in the obtainment of funds, the estimation of the technical aspects, the process of dealing with the public administration and the lack of adequate preparation to successfully launch the venture). In particular, the process of estimation of the technical feasibility has shown statistical significance at 10%, while other major obstacles showed all a strong pattern, but not enough to produce evidence with this threshold. It is worth

noticing that these positive effects are not registered in the case of business alumni. Please refer to exhibits n° 30 and 31.

### **The scenario analysis differences**

The scenario analysis grants the possibility to use a second tool to investigate the perceived obstacles. In this case, the focus is on three major elements, the technical aspect, the obtainment of funds and the soft skills. Also in this case we see a high degree of homogeneity in the responses. Indeed, when scenarios are ranked based on the average value obtained, the resulting rankings appear relatively similar, especially at the most extreme cases (i.e. the scenario in which all the elements are positive or negative). For example, between business and STEM students' rankings there are only three positions that are switched. At an aggregate level, the results are in line with the expectations, as the values progress linearly with the addition of the positive elements, with just a couple of exceptions. By computing the difference between scenarios that vary by just one element, it is possible to delineate the impact that this single element has on the evaluation of the scenario. It appears quite evidently that the most important element of the three is the one related to the soft skills. Indeed, its average impact is of 1.83, while the two others are both of 1.17.

By breaking down the values with respect to the single elements and the category of entrepreneur, we can analyse more in detail the impacts and compare them. Taking into consideration the technical aspect, we can see that their impact is equal for business and STEM alumni (value of 1.29), while it is much lower for the mixed ones (0.60). Instead, when considering the obtainment of funds, the value of business alumni reaches 1.43 and similarly the mixed alumni reach 1.65, while STEM on the opposite show a value of 0.82. About the soft skills, among all types of entrepreneurs the values reached are the highest, with 1.66 for business alumni, 1.88 for STEM ones and 2.10 for the mixed background ones. In sum, engineers give lower weight to the fact of having obtained funds and relatively more to the technical aspect, while the opposite is true for business alumni and the mixed background ones. However, all categories of entrepreneurs show the highest values homogeneously for the soft skills element (1.66 average increase for business, 1.88 for STEM and 2.10 for mixed ones).

Three linear regressions were utilized, one for all categories of alumni, one for business ones and one for STEM ones, while none was performed for mixed background alumni as there

were too few observations to rely on. As expected, they confirmed the rankings mentioned above, while also providing for the beta parameters. There are confirms that on an aggregate level the most highly deemed element is the one related to the soft skills. Regarding business alumni, their emphasis when few elements are confirmed in the scenarios is more on the technical aspects and less on the soft skills (interestingly scenario n° 6, where only the soft skills are positive, is the only one which is non-significant, or in other words, its value does not change from the baseline scenario). However, the opposite is true when there are more elements that are positive. On the other hand, engineers, when few elements are confirmed, similarly to business alumni give more emphasis on the technical aspect and soft skills at the same level (beta of 1.765 for both), while contrarily to business alumni, less on funds. When more elements are positive, STEM alumni pose more emphasis on the soft skills and on second place the technical aspect (while business ones signalled soft skills and the funds collection process). Again, it is highlighted how both categories indicate the soft skills as an essential element, while on the other hand engineers are keener on indicating the importance of technical aspects while business alumni on fund collection. On the other hand, when few elements are positive, having only the soft skills is deemed as irrelevant by business alumni while it is highly regarded by STEM ones. The regressions had both  $R^2$  and the adjusted  $R^2$  above 45%, and the graphs regarding the normality of the residuals and the P-P plot did not show any abnormal behaviour. Please refer to exhibit 32.

### **The comparison between students and entrepreneurs**

Once again, it is interesting to notice the homogeneity even between responses across students and entrepreneurs when taking into consideration the relative perceived severity of the obstacles. However, there are a few notable differences. Firstly, the students indicated a higher overall average perceived severity (average of 4.66 versus an overall average of roughly 4.10 for entrepreneurs), and especially in the obtainment of funds, the risk of losing personal stability (which presents the highest delta), and the perception of the personal abilities being fit for a career as an entrepreneur. These differences are understandable given the peculiar characteristics that university students have with respect to seasoned professionals, since the latter could leverage their experiences and their savings to tackle the cited obstacles. On the other hand, most of the other obstacles were perceived on a similar level (namely estimating the idea's value, the estimation of the technical aspects, the importance of building a strong team and having a professional network to rely on, the social stigma related to a potential

failure).

By breaking down the values by category of entrepreneur and by the before/after categorization, we can observe more closely the differences between the students' and entrepreneurs' perceptions. The systematic differences noted above are particularly strong for the risk of losing personal economic stability (1.25 of average difference) and slightly lower for the perception of the abilities (0.80 of average difference). However, it is interesting to notice that regarding the process of obtainment of funds the difference is consistent only with the value associated to the before categorization. This means that students estimate a "correct" magnitude of difficulty related to this task. Moreover, engineering students tend to overestimate the severity, when compared to their business counterparts (10 overestimations, measured as differences that are higher than the average value, versus 4). In this sense, the comparison between STEM students and STEM entrepreneurs reveal a higher tendency of overestimation by students. Please refer to exhibit 33.

## **Conclusions and discussion**

The empirical analysis allowed us to better understand the perceived obstacles related to the undertaking of a career in entrepreneurship. As expected, both differences and similarities were found when considering the students/entrepreneurs and business/STEM alumni category divisions.

Firstly, students' perceptions do not appear to differ consistently, neither in the entrepreneurial intention (to which, however, we observe a gender gap as expected) nor in the perceived severity of obstacles. Thus, H1 of this thesis is mainly rejected. Indeed, only few differences were noticeable, as a slightly overall tendency of giving higher scores by engineering students, a trend which is confirmed by entrepreneurs with an engineering background. The qualitative analysis highlighted two major differences. Engineering students expressed a higher degree of severity on the lack of proper academic preparation and the business ones expressed a higher degree of severity on forming a strong professional network and team. These trends will also be confirmed in the analysis of entrepreneurs. Thus, at the student level, there is a high level of homogeneity in terms of perceived obstacles, especially with respect to the high scores given to the obstacles related to the obtainment of funds and the personal economic stability.

Regarding entrepreneurs, one of the most interesting findings is that business alumni estimate the severity of the market and economic uncertainty prior to the venture's launch as a relatively weak obstacle. However, they end up with a similar level afterwards. STEM alumni instead signal a similar level with respect to their business counterparts on the severity of the technical aspect but end up after with a strongly lower value. This may signal a systematic overconfidence by business entrepreneurs and a constant underestimation by STEM entrepreneurs. This is also partly confirmed by the pattern registered similarly among students, of a higher overall average perceived severity for STEM alumni with respect to their business counterparts. Interestingly, also the other pattern registered among students, regarding the lack of adequate academic preparation and the team composition, is confirmed among entrepreneurs. Indeed, the STEM alumni signalled a more favourable consideration regarding the positive impact that has been received by an experience in an incubator. On the other side, business alumni signalled a similar favourable consideration with respect to the positive impact brought by a team member with a different academic background (supposedly, in most cases with a technical one). These appear to be the mediating factors that address the trends highlighted among students. This phenomenon is arguably due to the nature of the

complementary and positive effect. In fact, engineers would improve their business-related skills in the incubator, while a person with a technical background would integrate the lack of hard-skills knowledge of a person with a business background. The positive influence of the experience in an incubator is also confirmed by the analysis among STEM alumni. Those who participated signalled lower values (i.e. an improvement in the perception) after the launch and the experience in the incubator, while this effect is not present among those who did not participate. This effect applies to some of the key obstacles, such as the obtainment of funds, dealing with the government and estimating the technical aspects.

Regarding entrepreneurs with a mixed academic background, we observe that most of the different perceptions happen prior to the launch of the venture, with generally lower values given to the obstacles. This happens for example regarding the process of evaluating an idea and the technical aspects, with respect to both other categories of entrepreneurs. However, only a difference in the technical aspect remains after the launch of the venture, and only when compared to business alumni. It is not surprising to find that they also signal the lowest value on the obstacle related to the lack of an adequate academic preparation, in which they register a high difference especially when compared to the business alumni after the launch.

On a general level, it is possible to notice that the expectations (the values given for the time before the launch of the start-up) have a potential influence on the perceptions after the launch of the venture. For example, mixed background alumni may perceive themselves as very capable of handling all sorts of challenges, which can be seen in the particularly low value given when asked if a person with a different background brought skills that were lacking from their own background. This, in turn, potentially makes harsher their confrontation with the inevitable difficulties that they encounter. On the other hand, STEM alumni, starting from a relatively higher level of overall perceptions of the obstacles, eventually end up perceiving themselves as less overwhelmed, given their already high expectations in terms of difficulties to be faced. Indeed, expectations have an impact on entrepreneurs (*"Why Companies Fail— and How Their Founders Can Bounce Back"*, 2018). Interestingly, nationality was never found to be a significant variable. Both major categories of entrepreneurs signalled through a direct question a significant difference with respect to their founding peers having a different background regarding the vision in the perception of the obstacles.

By comparing entrepreneurs with university students, a homogeneity in responses is noticeable. However, expectedly students emphasized more the risk of losing personal economic stability and the obstacle of the possession of traits and skills to be a successful

entrepreneur. This is true also for the obtainment of funds, but only when compared to the evaluation given by entrepreneurs prior to the launch of the venture. More generally, it is striking to notice the relative homogeneity in the perceived severities of the obstacles, across both the student/entrepreneur as well as the business/STEM categorizations.

The scenario analysis highlights that both STEM and business entrepreneurs give emphasis on the soft skills as most relevant element. However, there is a divergence on the importance of the other two factors. As expected, those with an STEM background put more emphasis on the technical aspects, while those with a business one on the financial aspects. This can be explained by the affinity of their background with these particular issues. This result might indicate that the perception of the importance of certain issues may be skewed and biased with respect to the pool of knowledge more readily available to the entrepreneur. H2 has proved to be partly correct while H3 has found strong evidence in support.

### **Potential implications on education and the development of entrepreneurship**

By understanding the perceptions of students and entrepreneurs, we can draw some implications in terms of unlocking the potential to foster entrepreneurship. First, it is interesting to notice that students of both backgrounds signalled a high interest in launching a venture (value of approximately 5 out of 7). However, they also signalled that they are not informed about how to launch a start-up (value of 3.3 out of 7). In this sense, initiatives at universities with the aim of empowering and diffusing information regarding the world of entrepreneurship may help filling this gap (e.g. *"Bocconi Start-up Day"*, 2017). It is not surprising to see that many incubators are recently being developed in collaboration with universities (e.g. SpeedMiUp at Bocconi, PoliHub at Politecnico di Milano et cetera). In the same way, it is not surprising that some hybrid educational paths are emerging (business schools offering data science or programming majors). These kinds of elements could provide a broader view to students, that could potentially allow better performances in case of launch of a start-up due to the more diversified toolkit at their disposal. This process however must not inspire overconfidence, which could distort the expectations and thus cause harm to the dynamic of the launch of the venture.

### **The limitations of the thesis**

In this section the limitations of this thesis are discussed. First, some considerations regarding the sample used in the analysis. The number of respondents allows to give a significant basis to study the subject matter of interest. However, a more robust sample pool would further

strengthen and validate the results found. This could be achieved through a broader effort at an institutional level, such as horizontal collaboration between universities that could inquire their students on the subjects and topics presented in this study.

Secondly, regarding the entrepreneurs' sample, even though great care has been placed on trying to ensure a reasonable level of homogeneity in terms of level of innovativeness of the start-ups, it is still to be acknowledged that there is probably a relevant diversity within the sample taken under analysis. Indeed, it is extremely difficult to measure the level of riskiness and innovativeness of start-ups, and this variability may have effects on the respondents' answers. More in detail, entrepreneurs whose products or services were relatively riskier might have indicated as relatively more severe, for example, the uncertainty related to the estimation of the technical aspects of their product/service. On the other hand, entrepreneurs whose offering was mostly an incremental innovation or an application of a concept that has been already proven in some similar ways might have indicated this item as not having been a critical obstacle. This heterogeneity may partially distort the results as showed in the example, while some proxies of innovativeness and riskiness, such as asking how many patents were issued by their company, could have mitigated this bias. Nevertheless, a remarkably large sample pool would also hamper this negative effect. Similarly, the prior experience element has not been captured, and thus it has been incorporated in the error.

Another potential limitation is the absence of inputs provided in a bilateral interaction with the respondents. In particular, the standardisation of the descriptions and characterizations of the obstacles and contributions might lead to a loss of some of their multiple facets that might have been expressed. Indeed, respondents may have slightly or thoroughly different understanding and interpretations, or may pinpoint different aspects and details belonging to a same issue that they could deem as critical. These differences may have been captured in a more interactive process and methodology of data gathering, such as through focus groups or personal interviews.

As a further remark, it is worth noticing that the study has been conducted taking into consideration essentially students and alumni of three universities (namely, Católica Lisbon School of Business & Economics, Bocconi University and Politecnico di Milano). While being well known universities, with consolidated practices and frameworks based on the highest international standards, their level of representativeness may be arguable. Indeed, they may possess idiosyncrasies that may limit the potential for generalization of the findings discovered in this study. A horizontal panel could strengthen the findings, thus eliminating the potential

idiosyncrasies, which might be present in the analysed institutions. Lastly, it is worth mentioning that this study was focused on a very narrow segment of entrepreneurs, which are those who started ventures with high levels of innovation. This reduces the possibility for generalization, since its results may be applicable only to those entrepreneurs who launch start-ups with a similar level of innovativeness and may potentially differ from those who operate in a more traditional environment. As noted before, it is rather difficult to pinpoint and measure on a scale this level, and thus the boundaries for applicability are inevitably blurred.

### **The suggested further topics of research**

Regarding the limitations in terms of sample used in this study as described above, aside from the sheer number, it would be interesting to expand the set of respondents with respect to two factors. First, the cultural background in terms of country of origin, as this thesis focuses mainly on people coming from either Italy or Portugal. I expect that, depending on the cultural background, results may vary, since, as we have seen in the literature review section, cultural factors have strong implications in terms of entrepreneurial propensity.

Moreover, I think it would be interesting to further the analysis regarding the entrepreneurial orientation of alumni in subjects other than the STEM and business ones. As we saw in the introduction, most start-ups, especially operating in innovative sectors, are founded by these sets of alumni. For example, people with an academic background in humanities subjects may be to some extent in disadvantage with respect to those having more technical one in starting a new venture. Whether true or not, there may be a strong perception of personal unpreparedness in terms of relevant skills, framework, knowledge and experience. However, exactly because of their different point of view and set of skills, they may set up new ventures with consistent different approaches or focuses. They may see different opportunities, fill market niches, or be able to capture unserved or underserved needs on the market, or exploit different approaches. These differences could thus potentially create value through diversity. These possibilities, in addition to the fact that more technical skills can be outsourced or complemented through a mixed team composition, may potentially lead to the conclusion that there is an inefficiency in the market in terms of unexploited or underexploited talent. This is because valuable and innovative ideas are not strictly bounded to the knowledge of any specific subject in particular, and a considerable degree of revolutionary industry or business model transformations come from relatively simple ideas that do not require any particular technical knowledge.

However, some ideas may be pursued or not depending simply on one's own perception of probability of success. If this is the case, a self-reinforcing negative cycle would be in place, in which alumni of a particular subject, which is considered as not traditionally fitting with the background of a typical entrepreneur in an innovative sector, may simply forgo this career option due to the lack of successful cases, in a sort of self-fulfilling prophecy. In this regard, it would be interesting to try to measure and examine if relevant patterns appear, for example with respect to the dimensions and perceptions that have been examined in this thesis. Moreover, it would be interesting to examine their standard level of entrepreneurial propensity and how much certain courses, provision of information, laboratories, activities and workshops may influence it.

More broadly, future researches can further differentiate by asking the specific majors of their academic career, for both student categories and entrepreneurs. This would improve greatly the profiling and it would open to the possibility of considering more detailed variables that might have a relevant effect (for example, the specific courses that have been followed, the respondents' percentile grade of his/her class).

Another potentially interesting stream of research may focus on the differences between the perceived obstacles and risks by entrepreneurs and social entrepreneurs. Indeed, while they share many similarities (e.g. the need to form a team and a professional network, or to gather funds), they differ with respect to their goal (the one of the social entrepreneur being more oriented towards solving social and environmental problems), their interaction with key stakeholders (e.g. the government) and relationships with investors.

In a similar way, I would also suggest inquiring the difference in the perception of obstacles between entrepreneurs and intrapreneurs. Again, by taking into consideration their major differences (which were briefly noted in the introduction section), one could try to understand whether they lead to different levels of focus and perception of severity of major issues. Moreover, there would be the possibility to make parallels between the operations carried out, while monitoring where the emphasis is put at the various stages.

Moreover, I would also suggest to investigate the same perceptions on the obstacles used in this study in a sample of entrepreneurs that operate in a relatively more traditional setting, and thus with a lower degree of innovativeness. Then, one could observe how and by how much the perceived obstacles' severity changes by the variation in terms of innovativeness of the cases under analysis. As mentioned multiple times already, this can be

methodologically challenging, as defining this degree is not straightforward.

As a further step, I would advise to analyse what kind of information or guarantees might be most useful to aspiring entrepreneurs, to have a conscious choice selection process and promote a career in entrepreneurship. By using the term information, it would include data regarding market conditions, the prospect in terms of break-even point or survival chances of the implementation of their ideas. As guarantees I refer to the preferred financial support composition and terms. In other words, this may be seen as inquiring to potential aspiring entrepreneurs what kind of financial security, given positive prospects under all other major factors, would lead them to undertake this career. This can be studied both at a perceived level, that is, by asking them directly their preferences, and also at an empirical and experimental level, to see on the field what combination of information and guarantees may provide the best survival and success rate among new and innovative ventures.

Moreover, I think it would be interesting to inquire whether STEM and business alumni launch consistently different ventures. This can be observed in terms of degree of innovativeness of the product/service offered (however hardly measurable), the number of patent issued related to the start-up product or service, the team composition, the overall performance and rate of survival. On top of this, there would be also the possibility to observe consistent patterns in terms of lifecycle of the start-ups. For example, by studying the timings of the start-up exits or the rate of CEO substitution or any other operations regarding the administration of the venture. This level of analysis could be even made deeper by considering the success indicators, such as growth and revenues, to measure their success rates.

In addition, it would be interesting to further inquire the effect of incubator programs and team diversity composition on the various categories of entrepreneurs. This would allow to better understand the effects of these two elements that in this research appeared to be so heavily important on the start-up developments, and that were signalled with a heterogeneous level of importance by business and engineering alumni.

As a direct further step of this research, it would be interesting to understand if there an over or under estimation of the obstacles under exam. This would allow us to understand how much they are psychological or whether they are concrete hardships with severe negative impacts.

As noted in the introduction, we are living in a time of great changes and disruptions, given the quantity of innovations and transformations that we are observing in several

industries. In particular, I would suggest both exploratory and experimental approaches, as the level of complexity of the matter may increase by mirroring the growing complexity that these changes bring with themselves. Thus, at a general level, I think that it is then essential to further deploy efforts in the researches on the entrepreneurial process, both its drivers and obstacles.

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## Exhibits

### Exhibit A

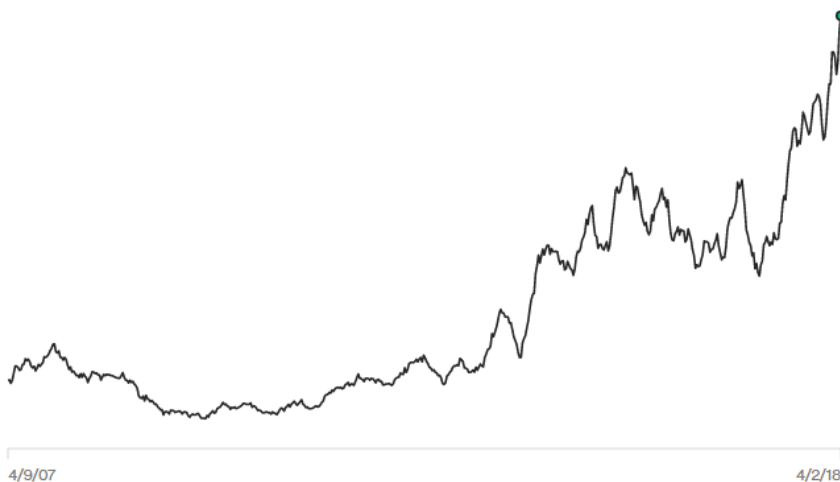
	Youth unemployment rate				Youth unemployment ratio			
	2007	2014	2015	2016	2007	2014	2015	2016
EU-28	15.9	22.2	20.3	18.7	6.9	9.2	8.4	7.7
Euro area	15.6	23.8	22.4	20.9	6.7	9.5	8.8	8.2
Belgium	18.8	23.2	22.1	20.1	6.4	7.0	6.6	5.7
Bulgaria	14.1	23.8	21.6	17.2	4.2	6.5	5.6	4.1
Czech Republic	10.7	15.9	12.6	10.5	3.4	5.1	4.1	3.4
Denmark	7.5	12.6	10.8	12.0	5.3	7.8	6.7	7.9
Germany	11.8	7.7	7.2	7.0	6.1	3.9	3.5	3.5
Estonia	10.1	15.0	13.1	13.4	3.8	5.9	5.5	5.8
Ireland	9.1	23.9	20.9	17.2	5.1	8.9	7.6	6.7
Greece	22.7	52.4	49.8	47.3	7.0	14.7	12.9	11.7
Spain	18.1	53.2	48.3	44.4	8.7	19.0	16.8	14.7
France	19.5	24.2	24.7	24.6	7.2	8.7	9.0	9.0
Croatia	25.4	44.9	42.3	31.1	9.2	15.3	14.0	11.6
Italy	20.4	42.7	40.3	37.8	6.3	11.6	10.6	10.0
Cyprus	10.2	36.0	32.8	29.1	4.2	14.5	12.4	10.7
Latvia	10.6	19.6	16.3	17.3	4.5	7.9	6.7	6.9
Lithuania	8.4	19.3	16.3	14.5	2.3	6.6	5.5	5.1
Luxembourg	15.6	22.3	16.6	19.2	4.0	6.0	6.1	5.8
Hungary	18.1	20.4	17.3	12.9	4.6	6.0	5.4	4.2
Malta	13.5	11.7	11.8	11.1	7.3	6.1	6.1	5.7
Netherlands	9.4	12.7	11.3	10.8	4.3	8.6	7.7	7.4
Austria	9.4	10.3	10.6	11.2	5.6	6.0	6.1	6.5
Poland	21.6	23.9	20.8	17.7	7.1	8.1	6.8	6.1
Portugal	21.4	34.7	32.0	28.2	8.6	11.9	10.7	9.3
Romania	19.3	24.0	21.7	20.6	6.1	7.1	6.8	5.8
Slovenia	10.1	20.2	16.3	15.2	4.2	6.8	5.8	5.1
Slovakia	20.6	29.7	26.5	22.2	7.1	9.2	8.5	7.2
Finland	16.5	20.5	22.4	20.1	8.8	10.7	11.7	10.5
Sweden	19.2	22.9	20.4	18.9	10.1	12.7	11.2	10.4
United Kingdom	14.3	17.0	14.6	13.0	8.8	9.8	8.6	7.6
Iceland	7.1	10.0	8.8	6.5	5.6	7.7	7.1	5.4
Norway	7.2	7.9	9.9	10.9	4.4	4.3	5.5	6.1
Switzerland	.	.	.	.	.	.	.	.
Turkey	17.2	18.0	18.6	19.6	6.3	7.3	7.7	8.2
United States	10.5	13.4	11.6	10.4	.	.	.	.
Japan	7.7	6.2	5.5	5.1	.	.	.	.

: data not available

Source: Eurostat (une\_rt\_a)

Source: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics)

### Exhibit B



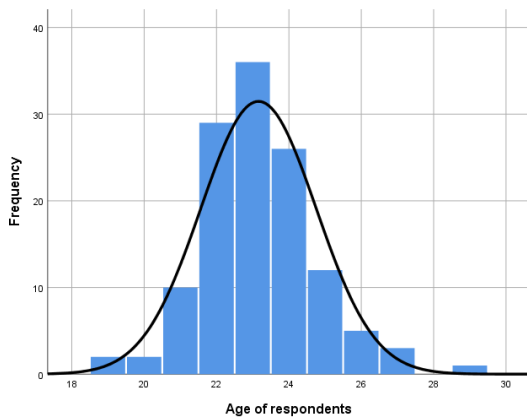
Our index incorporates both the money flowing into VC-backed startups, as well as the exits that are making money for investors. To smooth out some of the volatility, we calculated the average value for the last 12 weeks.

Source: Bloomberg U.S. Startups Barometer. (2018). Bloomberg.com. Retrieved 8 April 2018, from <https://www.bloomberg.com/graphics/startup-barometer/>

Exhibit 1

	Technical	Mixed	Soft
<b>Endogenous</b> (mainly depends at a personal level)	<ul style="list-style-type: none"> <li>Estimating the technical aspects of the product/service (feasibility, superiority, reliability etc.)</li> </ul>	<ul style="list-style-type: none"> <li>The availability of other career options</li> </ul>	<ul style="list-style-type: none"> <li>Building a team and having a professional network</li> <li>The perception of one's own ability and traits as not matching those of a potential entrepreneur</li> </ul>
<b>Mixed</b>	<ul style="list-style-type: none"> <li>Spotting an economic opportunity and estimating the value</li> </ul>	<ul style="list-style-type: none"> <li>Obtaining funding</li> <li>The risk of losing personal economic stability</li> </ul>	<ul style="list-style-type: none"> <li>Potential personal constraints (time and effort)</li> </ul>
<b>Exogenous</b> (mainly depends on an external force)	<ul style="list-style-type: none"> <li>Lack of adequate academic preparation to begin a start-up</li> </ul>	<ul style="list-style-type: none"> <li>Dealing with the government (regulations, taxes and bureaucracy)</li> <li>Market and economic uncertainty</li> </ul>	<ul style="list-style-type: none"> <li>The social stigma related to failure</li> </ul>

Exhibit 2.1 and 2.2



Are you studying in the field of economics/management or engineering?	Count	Percentage
Economics/management	90	71%
Engineering	36	29%
<b>Gender</b>		
Male	70	56%
Female	56	44%
<b>Age - You age</b>		
Average	23	
Max	29	
Min	19	
<b>Is at least one of your family members (close relatives) self-employed?</b>		
Yes	68	
No	58	
<b>Are you Italian or non-Italian?</b>		
Italian	87	69%
Non-Italian	39	31%

### Exhibit 3

Business students - 90		Engineering students - 36		Diff	Abs	> 5%
Bureaucracy/legal environment: 13	14%	Bureaucracy/legal environment: 4	11%	3%	3%	FALSE
Funding: 41	46%	Funding: 15	42%	4%	4%	FALSE
Taxes: 8	9%	Taxes: 4	11%	-2%	2%	FALSE
Team/network: 10	11%	Team/network: 1	3%	8%	8%	8%
Idea: 16	18%	Idea: 5	14%	4%	4%	FALSE
External economic uncertainty/environment/incentives/competition: 27	30%	External economic uncertainty/environment/incentives/competition: 9	25%	5%	5%	FALSE
Courage/risk aversion/failure/believe in yourself: 23	26%	Courage/risk aversion/failure/believe in yourself: 8	22%	3%	3%	FALSE
Personal ec. stability & other constraints (family): 25	28%	Personal ec. stability & other constraints: 12	33%	-6%	6%	6%
Education/experience: 9	10%	Education/experience: 6	17%	-7%	7%	7%
Culture: 4	4%	Culture: 2	6%	-1%	1%	FALSE
Luck: 1		Luck: 0				
Time: 2		Time: 0				

### Exhibit 4

	Have you ever considered about undertaking the entrepreneurial career (to start an entrepreneurial venture of your own)?	Have you ever documented yourself and gathered information about starting a new venture?	Other things being equal, would you rather be an entrepreneur or an employee?
All means	4.43	3.37	4.94
Econ	4.38	3.44	4.88
Engi	4.56	3.17	5.08
Diff	0.18	-0.28	0.21
All Stdv	1.83	1.86	1.78
Econ	1.88	1.85	1.80
Engi	1.71	1.87	1.73

### Exhibit 5

	The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture (and the potential related rewards)	Estimating the technical feasibility of the product/service	Obtaining funding	Building a team and having a professional network	The social stigma related to failure	The risk of losing personal economic stability	Potential personal constraints (e.g. expected effort and time dedication requested higher than average)	The nicheness of the entrepreneurial career and the availability of other career options	The perception of one's own abilities and traits (among which, for example, the risk taking behaviour) as not matching those of a potential entrepreneur	Total average
All means	4.67	4.72	5.64	4.77	3.77	5.56	4.01	3.74	4.31	4.58
Econ	4.57	4.68	5.59	4.74	3.74	5.48	3.97	3.64	4.33	4.53
Engi	4.94	4.83	5.78	4.83	3.83	5.75	4.11	3.97	4.25	4.70
Diff	0.38	0.16	0.19	0.09	0.09	0.27	0.14	0.33	-0.08	
Filtered	0.38	FALSE	FALSE	FALSE	FALSE	0.27	FALSE	0.33	FALSE	
All Stdv	1.51	1.42	1.59	1.71	1.32	1.66	1.43	1.54	1.41	
Econ	1.65	1.39	1.48	1.58	1.75	1.33	1.59	1.47	1.57	
Engi	1.62	1.78	1.29	1.63	1.65	1.32	1.83	1.32	1.50	

### Exhibit 6 and 7

#### Correlation Matrix<sup>a</sup>

a. Determinant = ,294

#### KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	,694
Bartlett's Test of Sphericity	Approx. Chi-Square
	150,638
	df
	3
	Sig.
	,000

## Exhibit 8 and 9

### Anti-image Matrices

		Have you ever considered about undertaking the entrepreneurial career (to start an entrepreneurial venture of your own)? - 1	Have you ever documented yourself and gathered information about starting a new venture? - 1	Other things being equal, would you rather be an entrepreneur or an employee? - 1
Anti-image Covariance	Have you ever considered about undertaking the entrepreneurial career (to start an entrepreneurial venture of your own)? - 1	,411	-,238	-,232
	Have you ever documented yourself and gathered information about starting a new venture? - 1	-,238	,529	-,079
	Other things being equal, would you rather be an entrepreneur or an employee? - 1	-,232	-,079	,544
Anti-image Correlation	Have you ever considered about undertaking the entrepreneurial career (to start an entrepreneurial venture of your own)? - 1	,643 <sup>a</sup>	-,511	-,490
	Have you ever documented yourself and gathered information about starting a new venture? - 1	-,511	,724 <sup>a</sup>	-,148
	Other things being equal, would you rather be an entrepreneur or an employee? - 1	-,490	-,148	,735 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

### Communalities

	Initial	Extraction
Have you ever considered about undertaking the entrepreneurial career (to start an entrepreneurial venture of your own)? - 1	1,000	,823
Have you ever documented yourself and gathered information about starting a new venture? - 1	1,000	,720
Other things being equal, would you rather be an entrepreneur or an employee? - 1	1,000	,710

Extraction Method: Principal Component Analysis.

## Exhibit 10

### Total Variance Explained

Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,253	75,099	75,099	2,253	75,099	75,099
2	,468	15,589	90,688			
3	,279	9,312	100,000			

Extraction Method: Principal Component Analysis.

## Exhibit 11

### Component Matrix<sup>a</sup>

	Component 1
Have you ever considered about undertaking the entrepreneurial career (to start an entrepreneurial venture of your own)? - 1	,907
Have you ever documented yourself and gathered information about starting a new venture? - 1	,849
Other things being equal, would you rather be an entrepreneur or an employee? - 1	,843

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Exhibit 12

**ANOVA**

BART factor score 1 for analysis 1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6,679	1	6,679	7,000	,009
Within Groups	118,321	124	,954		
Total	125,000	125			

Exhibit 13

**Tests of Between-Subjects Effects**

Dependent Variable: The capacity and chance of spotting an opportunity and estimating the potential economic value

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11,087 <sup>a</sup>	2	5,543	2,088	,128	,033
Intercept	1452,976	1	1452,976	547,249	,000	,816
Gendermale0female1	7,417	1	7,417	2,794	,097	,022
Areyoustudyinginthefieldofecon0orengi1	8,353	1	8,353	3,146	,079	,025
Error	326,572	123	2,655			
Total	3091,000	126				
Corrected Total	337,659	125				

a. R Squared = ,033 (Adjusted R Squared = ,017)

Exhibit 14

**ANOVA**

		Sum of Squares	df	Mean Square	F	Sig.
The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture (and the potential related rewards)	Between Groups	3,670	1	3,670	1,363	,245
	Within Groups	333,989	124	2,693		
	Total	337,659	125			
The risk of losing personal economic stability	Between Groups	1,906	1	1,906	1,088	,299
	Within Groups	217,206	124	1,752		
	Total	219,111	125			
The nicheness of the entrepreneurial career and the availability of other career options	Between Groups	2,763	1	2,763	1,351	,247
	Within Groups	253,594	124	2,045		
	Total	256,357	125			
Factor on entrepreneurial propensity	Between Groups	,017	1	,017	,017	,895
	Within Groups	124,983	124	1,008		
	Total	125,000	125			

### Exhibit 15

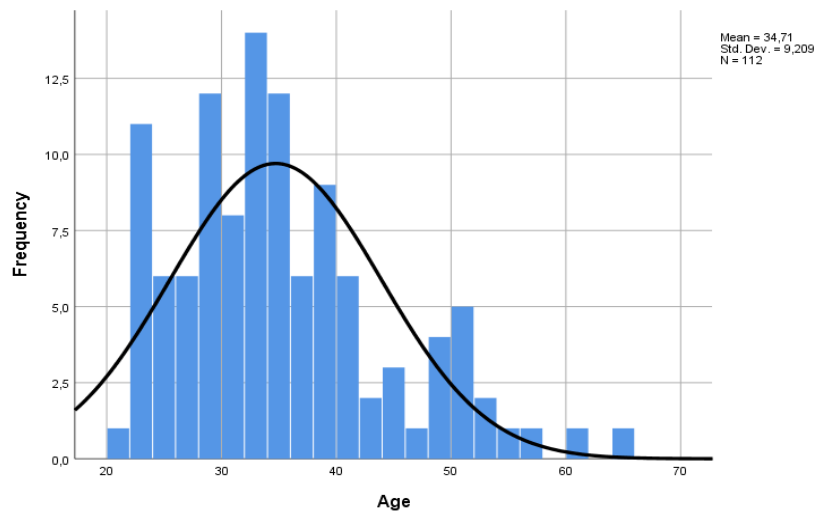
What is your academic and university background?	Count	Percentage	At what age (in numbers) did you start working in the start-up?	Count	Percentage
Business/economics/finance	45	40%	average	31	
Mixed (e.g. Bachelor in engineering and MBA in business)	15	13%	min	19	
Engineering or any STEM subject	52	46%	max	57	
What is your highest level of education achieved?			Did you have in your start-up team, for a significant amount of time, at least a person with another academic/university background?		
Bachelor	35	31%	Yes	99	88%
Master of Science	37	33%	No	13	12%
PhD	16	14%	Did you participate in an incubator during your start-up experience?		
Other Post Graduate (e.g. MBA)	24	21%	Yes	57	51%
Gender			No	55	49%
Male	91	81%	Are you still working in the start-up?		
Female	21	19%	Yes	88	79%
Age			I prefer not to answer	3	3%
Average	35		No	11	10%
Min	21		Part-time/as an external consultant	10	9%
Max	65				
Are you Italian or non-Italian?					
Non-Italian (please specify in the text entry box)	42	38%			
Italian	70	63%			

### Exhibit 16.A and 16.B

**Statistics**

Age (in numbers)

N	Valid	Missing
	112	5
Mean	34,71	
Median	33,00	
Std. Deviation	9,209	
Skewness	,883	
Std. Error of Skewness	,228	
Kurtosis	,572	
Std. Error of Kurtosis	,453	
Minimum	21	
Maximum	65	
Percentiles		
	25	29,00
	50	33,00
	75	39,00



### Exhibit 17

		The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Estimating the technical feasibility, reliability and competitive advantage of the product/service	Obtaining funding	Building the team and having a strong professional network	Dealing with the government: regulations, taxes and bureaucracy	The risk of losing personal economic stability	The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	Lack of adequate academic preparation to begin a start-up	The social stigma related to a potential failure	Market and economic uncertainty	Averages
All	Before	4.40	4.29	4.83	4.34	4.33	4.37	4.04	3.52	3.07	3.22	4.13	4.05
	After	4.34	4.27	5.23	4.85	4.80	4.41	4.14	3.52	2.82	3.18	4.26	4.17
	Diff	-0.06	-0.02	0.40	0.51	0.47	0.04	0.10	0.00	-0.25	-0.04	0.13	0.12
Econ	Before	4.36	4.31	4.60	4.53	4.07	4.16	4.09	3.56	3.29	3.33	3.78	4.01
	After	4.58	4.84	5.27	4.76	5.13	4.71	4.51	3.91	3.13	3.48	4.13	4.41
STEM	Before	4.73	4.42	4.92	4.25	4.31	4.33	4.08	3.62	2.92	3.07	4.52	4.11
	After	4.13	3.81	5.23	4.85	4.52	4.12	3.75	3.23	2.65	2.89	4.38	3.96
Mixed	Before	3.40	3.73	5.20	4.07	5.20	5.13	3.80	3.07	2.93	3.46	3.87	3.99
	After	4.33	4.13	5.13	5.13	4.80	4.53	4.40	3.33	2.47	3.38	4.20	4.17
STEM - Business	Before	0.38	0.11	0.32	-0.28	0.24	0.17	-0.01	0.06	-0.37	-0.27	0.74	
	After	-0.44	-1.04	-0.04	0.09	-0.61	-0.60	-0.76	-0.68	-0.48	-0.60	0.25	
Cleaned	Before	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	0.74	
	After	-0.44	-1.04	FALSE	FALSE	-0.61	-0.60	-0.76	-0.68	-0.48	-0.60	FALSE	-0.65

Exhibit 18

		The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Estimating the technical feasibility, reliability and competitive advantage of the product/service	Obtaining funding	Building the team and having a strong professional network	Dealing with the government: regulations, taxes and bureaucracy	The risk of losing personal economic stability	The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	Lack of adequate academic preparation to begin a start-up	The social stigma related to a potential failure	Market and economic uncertainty	Averages	
Mixed-Econ	Before	-0.96	-0.58	0.60	-0.47	1.13	0.98		-0.29	-0.49	-0.36	0.13	0.09	-0.02
	After	-0.24	-0.71	-0.13	0.38	-0.33	-0.18		-0.11	-0.58	-0.67	-0.10	0.07	-0.24
Mixed-STEM	Before	-1.33	-0.69	0.28	-0.18	0.89	0.81		-0.28	-0.55	0.01	0.39	-0.65	-0.12
	After	0.20	0.33	-0.10	0.29	0.28	0.42		0.65	0.10	-0.19	0.50	-0.18	0.21
Cleaned	Before	-0.96	-0.58	0.60	-0.47	1.13	0.98	FALSE		-0.49	FALSE	FALSE	FALSE	
Mixed-Econ	After	FALSE	-0.71	FALSE	FALSE	FALSE	FALSE	FALSE		-0.58	-0.67	FALSE	FALSE	
Cleaned	Before	-1.33	-0.69	FALSE	FALSE	0.89	0.81	FALSE		-0.55	FALSE	FALSE	-0.65	
Mixed-STEM	After	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	0.65	FALSE	FALSE	FALSE	0.50	FALSE	

Exhibit 19.A

	"1-1-1" - The reliability and technical superiority of the product has been proven. - Has already collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"0-0-0" - The reliability and technical superiority of the product has not yet been proven. - Has not yet collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	"1-1-0" - The reliability and technical superiority of the product has been proven. - Has already collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	"1-0-0" - The reliability and technical superiority of the product has been proven. - Has not yet collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	"0-1-1" - The reliability and technical superiority of the product has not yet been proven. - Has already collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"0-0-1" - The reliability and technical superiority of the product has not yet been proven. - Has not yet collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"1-0-1" - The reliability and technical superiority of the product has been proven. - Has not yet collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"0-1-0" - The reliability and technical superiority of the product has not yet been proven. - Has already collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	Average
All	5.17	1.14	3.46	2.80	4.77	2.81	4.97	3.00	3.52
Econ	5.29	1.10	3.55	2.83	4.82	2.29	4.46	2.75	3.38
Engi	4.89	1.24	3.57	3.00	4.75	3.00	5.54	2.85	3.60
Mixed	5.33	0.50	2.67	2.00	4.67	3.00	4.83	4.25	3.41
All	8	1	5	2	6	3	7	4	
econ	8	1	5	4	7	2	6	3	
engi	7	1	5	4	6	3	8	2	
mixed	8	1	3	2	6	4	7	5	
1-0-0	0.40		0.46	1.66			2.16		1.17
0-1-0	0.20		0.66		1.96			1.86	1.17
0-0-1	1.71				1.77	1.67	2.17		1.83

Exhibit 19.B

	"1-1-1" - The reliability and technical superiority of the product has been proven. - Has already collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"0-0-0" - The reliability and technical superiority of the product has not yet been proven. - Has not yet collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	"1-1-0" - The reliability and technical superiority of the product has been proven. - Has already collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	"1-0-0" - The reliability and technical superiority of the product has been proven. - Has not yet collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	"0-1-1" - The reliability and technical superiority of the product has not yet been proven. - Has already collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"0-0-1" - The reliability and technical superiority of the product has not yet been proven. - Has not yet collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"1-0-1" - The reliability and technical superiority of the product has been proven. - Has not yet collected the funds that it requires. - The team has shown strong soft skills, in terms of communication, teamwork and	"0-1-0" - The reliability and technical superiority of the product has not yet been proven. - Has already collected the funds that it requires. - The team has shown weak soft skills, in terms of communication, teamwork and	Average
1-0-0 B	0.47		0.80	1.73			2.18		1.29
1-0-0 E	0.14		0.73	1.76			2.54		1.29
1-0-0 M	0.67		-1.58	1.50			1.83		0.60
0-1-0 B	0.82		0.71		2.53			1.65	1.43
0-1-0 E	-0.65		0.57		1.75			1.61	0.82
0-1-0 M	0.50		0.67		1.67			3.75	1.65
0-0-1 B	1.74				2.07	1.19	1.63		1.66
0-0-1 E	1.32				1.90	1.76	2.54		1.88
0-0-1 M	2.67				0.42	2.50	2.83		2.10

Exhibit 19.C (from left to right, all, business alumni, STEM alumni)

scenario1	4.473	scenario1	4.186	scenario7	4.303
scenario7	3.831	scenario5	3.718	Scenario1	3.654
scenario5	3.631	scenario7	3.362	scenario5	3.515
scenario3	2.326	scenario3	2.445	scenario3	2.336
scenario8	1.862	scenario4	1.733	scenario4	1.765
scenario6	1.670	scenario8	1.650	scenario6	1.765
scenario4	1.662	scenario6	1.186	scenario8	1.611
(Constant)	1.138	(Constant)	1.100	(Constant)	1.235

## Exhibit 20.A

### Tests of Between-Subjects Effects

Dependent Variable: Before - Market and economic uncertainty

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	27,498 <sup>a</sup>	3	9,166	5,058	,003	,140
Intercept	721,679	1	721,679	398,262	,000	,811
Gender0male1female	11,072	1	11,072	6,110	,015	,062
HighestAchieved	3,882	1	3,882	2,142	,147	,023
Engineering	16,940	1	16,940	9,348	,003	,091
Error	168,523	93	1,812			
Total	1887,000	97				
Corrected Total	196,021	96				

a. R Squared = ,140 (Adjusted R Squared = ,113)

## Exhibit 20.B

### Parameter Estimates

Dependent Variable: Before - Market and economic uncertainty

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	4,611	,252	18,306	,000	4,111	5,111	,783
Gender0male1female	,840	,340	2,472	,015	,165	1,514	,062
HighestAchieved	-,196	,134	-1,464	,147	-,461	,070	,023
[Engineering=0]	-,847	,277	-3,057	,003	-1,397	-,297	,091
[Engineering=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

## Exhibit 21.A

### Tests of Between-Subjects Effects

Dependent Variable: After - Estimating the technical feasibility, reliability and competitive advantage of the product/ser

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	29,217 <sup>a</sup>	2	14,609	6,004	,004	,113
Intercept	175,906	1	175,906	72,301	,000	,435
Didyouhaveinyourstartupteamforasignificantamountoftimeatleastape	3,288	1	3,288	1,351	,248	,014
Engineering	25,244	1	25,244	10,376	,002	,099
Error	228,700	94	2,433			
Total	2042,000	97				
Corrected Total	257,918	96				

a. R Squared = ,113 (Adjusted R Squared = ,094)

## Exhibit 21.B

### Parameter Estimates

Dependent Variable: After - Estimating the technical feasibility, reliability and competitive advantage of the product/service

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	3,323	,469	7,081	,000	2,392	4,255	,348
Didyouhaveinyourstartupteamforasignificantamountoftimeatleastape	,560	,481	1,162	,248	-,396	1,515	,014
[Engineering=0]	1,024	,318	3,221	,002	,393	1,655	,099
[Engineering=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

## Exhibit 22.A

### Tests of Between-Subjects Effects

Dependent Variable: After - The potential personal constraints of becoming an entrepreneur (time and effort

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	18,850 <sup>a</sup>	2	9,425	3,163	,047	,063
Intercept	683,413	1	683,413	229,334	,000	,709
HighestAchieved	4,875	1	4,875	1,636	,204	,017
Engineering	15,714	1	15,714	5,273	,024	,053
Error	280,119	94	2,980			
Total	1932,000	97				
Corrected Total	298,969	96				

a. R Squared = ,063 (Adjusted R Squared = ,043)

## Exhibit 22.B

### Parameter Estimates

Dependent Variable: After - The potential personal constraints of becoming an entrepreneur (time and effort required) an

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	3,485	,317	11,001	,000	2,856	4,114	,563
HighestAchieved	,219	,171	1,279	,204	-,121	,559	,017
[Engineering=0]	,812	,354	2,296	,024	,110	1,515	,053
[Engineering=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

## Exhibit 23.A

### Tests of Between-Subjects Effects

Dependent Variable: Before - The risk of losing personal economic stability

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	27,306 <sup>a</sup>	2	13,653	3,552	,035	,111
Intercept	507,923	1	507,923	132,142	,000	,699
HighestAchieved	16,550	1	16,550	4,306	,043	,070
Mixed	19,746	1	19,746	5,137	,027	,083
Error	219,094	57	3,844			
Total	1408,000	60				
Corrected Total	246,400	59				

a. R Squared = ,111 (Adjusted R Squared = ,080)

## Exhibit 23.B

### Parameter Estimates

Dependent Variable: Before - The risk of losing personal economic stability

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	6,112	,692	8,834	,000	4,727	7,498	,578
HighestAchieved	-,565	,272	-2,075	,043	-1,110	-,020	,070
[Mixed=0]	-1,404	,620	-2,267	,027	-2,645	-,164	,083
[Mixed=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

## Exhibit 24.A

### Tests of Between-Subjects Effects

Dependent Variable: Before - Dealing with the government: regulations, taxes and bureaucracy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	64,786 <sup>a</sup>	5	12,957	4,577	,001	,298
Intercept	234,807	1	234,807	82,947	,000	,606
HighestAchieved	27,312	1	27,312	9,648	,003	,152
AreyouItalianornonItalian SelectedChoiceIta0nonita 1	5,514	1	5,514	1,948	,169	,035
Forhowmuchhaveyouworkedinyourstartup	4,040	1	4,040	1,427	,237	,026
Didyouparticipateinanincubatorduringyourstartupexperience0yes1	4,821	1	4,821	1,703	,197	,031
Mixed	33,124	1	33,124	11,701	,001	,178
Error	152,864	54	2,831			
Total	1353,000	60				
Corrected Total	217,650	59				

a. R Squared = ,298 (Adjusted R Squared = ,233)

## Exhibit 24.B

### Parameter Estimates

Dependent Variable: Before - Dealing with the government: regulations, taxes and bureaucracy

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	6,606	,758	8,712	,000	5,086	8,126	,584
HighestAchieved	-,759	,244	-3,106	,003	-1,249	-,269	,152
AreyouItalianornonItalian SelectedChoiceIta0nonita 1	-,732	,524	-1,396	,169	-1,783	,319	,035
Forhowmuchhaveyouworkedinyourstartup	,149	,125	1,195	,237	-,101	,399	,026
Didyouparticipateinanincubatorduringyourstartupexperience0yes1	-,608	,466	-1,305	,197	-1,541	,326	,031
[Mixed=0]	-1,835	,536	-3,421	,001	-2,911	-,760	,178
[Mixed=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

## Exhibit 25.A

### Tests of Between-Subjects Effects

Dependent Variable: After - Estimating the technical feasibility, reliability and competitive advantage of the product/ser

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	30,926 <sup>a</sup>	5	6,185	2,869	,023	,210
Intercept	49,166	1	49,166	22,808	,000	,297
Didyouparticipateinanincubatorduringyourstartupexperience0yes1	8,406	1	8,406	3,899	,053	,067
Gender0male1female	5,745	1	5,745	2,665	,108	,047
AreyouItalianornonItalian SelectedChoiceIta0nonita 1	5,677	1	5,677	2,634	,110	,047
Didyouhaveinyourstartupteamforasignificantamountoftimeatleastape	3,735	1	3,735	1,732	,194	,031
Mixed	11,080	1	11,080	5,140	,027	,087
Error	116,407	54	2,156			
Total	1454,000	60				
Corrected Total	147,333	59				

a. R Squared = ,210 (Adjusted R Squared = ,137)

## Exhibit 25.B

### Parameter Estimates

Dependent Variable: After - Estimating the technical feasibility, reliability and competitive advantage of the product/service

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	2,681	,759	3,533	,001	1,160	4,202	,188
Didyouparticipateinanincubator during your startup experience no/yes1	,799	,405	1,975	,053	-,012	1,611	,067
Gender0male1female	-,811	,497	-1,632	,108	-1,808	,185	,047
AreyouItalianornonItalian SelectedChoiceIeltaDnonita1	,730	,450	1,623	,110	-,172	1,632	,047
Didyouhaveinyourstartupteamforasignificantamountoftimeatleastape	,844	,641	1,316	,194	-,442	2,130	,031
[Mixed=0]	1,027	,453	2,267	,027	,119	1,936	,087
[Mixed=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

## Exhibit 26.A

### Tests of Between-Subjects Effects

Dependent Variable: Before - The capacity and chance of spotting an opportunity and estimating the potential economic

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	27,973 <sup>a</sup>	3	9,324	4,958	,004	,191
Intercept	133,636	1	133,636	71,062	,000	,530
Forhowmuchhaveyouworkedinyourstartup	3,054	1	3,054	1,624	,207	,025
Didyouhaveinyourstartupteamforasignificantamountoftimeatleastape	5,114	1	5,114	2,720	,104	,041
Mixed	16,610	1	16,610	8,833	,004	,123
Error	118,474	63	1,881			
Total	1463,000	67				
Corrected Total	146,448	66				

a. R Squared = ,191 (Adjusted R Squared = ,152)

## Exhibit 26.B

### Parameter Estimates

Dependent Variable: Before - The capacity and chance of spotting an opportunity and estimating the potential economic value of t

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	3,937	,619	6,361	,000	2,700	5,174	,391
Forhowmuchhaveyouworkedinyourstartup	,075	,059	1,274	,207	-,043	,194	,025
Didyouhaveinyourstartupteamforasignificantamountoftimeatleastape	-,861	,522	-1,649	,104	-1,904	,182	,041
[Mixed=0]	1,209	,407	2,972	,004	,396	2,023	,123
[Mixed=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

## Exhibit 27.A

	The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Estimating the technical feasibility, reliability and competitive advantage of the product/service	Obtaining funding	Building the team and having a strong professional network	Dealing with the government: regulations, taxes and bureaucracy	The risk of losing personal economic stability	The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	Lack of adequate academic preparation to begin a start-up	The social stigma related to a potential failure	Market and economic uncertainty	Averages
<b>All</b>	Before: 4.40 After: 4.34 Diff: -0.06	Before: 4.29 After: 4.27 Diff: -0.02	Before: 4.83 After: 5.23 Diff: 0.40	Before: 4.34 After: 4.85 Diff: 0.51	Before: 4.33 After: 4.80 Diff: 0.47	Before: 4.37 After: 4.41 Diff: 0.04	Before: 4.04 After: 4.14 Diff: 0.10	Before: 3.52 After: 3.52 Diff: 0.00	Before: 3.07 After: 2.82 Diff: -0.25	Before: 3.22 After: 3.18 Diff: -0.04	Before: 4.13 After: 4.26 Diff: 0.13	
<b>Econ</b>	Before: 4.36 After: 4.58 Diff: 0.22	Before: 4.31 After: 4.84 Diff: 0.53	Before: 4.60 After: 5.27 Diff: 0.67	Before: 4.53 After: 4.76 Diff: 0.22	Before: 4.07 After: 5.13 Diff: 1.07	Before: 4.16 After: 4.71 Diff: 0.56	Before: 4.09 After: 4.51 Diff: 0.42	Before: 3.56 After: 3.91 Diff: 0.36	Before: 3.29 After: 3.13 Diff: -0.16	Before: 3.33 After: 3.48 Diff: 0.15	Before: 3.78 After: 4.13 Diff: 0.36	Before: 4.01 After: 4.41 Diff: 0.40
<b>STEM</b>	Before: 4.73 After: 4.13 Diff: -0.60	Before: 4.42 After: 3.81 Diff: -0.62	Before: 4.92 After: 5.23 Diff: 0.31	Before: 4.25 After: 4.85 Diff: 0.60	Before: 4.31 After: 4.52 Diff: 0.21	Before: 4.33 After: 4.12 Diff: -0.21	Before: 4.08 After: 3.75 Diff: -0.33	Before: 3.62 After: 3.23 Diff: -0.38	Before: 2.92 After: 2.65 Diff: -0.27	Before: 3.07 After: 2.89 Diff: -0.18	Before: 4.52 After: 4.38 Diff: -0.13	Before: 4.11 After: 3.96 Diff: -0.15
<b>Mixed</b>	Before: 3.40 After: 4.33 Diff: 0.93	Before: 3.73 After: 4.13 Diff: 0.40	Before: 5.20 After: 5.13 Diff: -0.07	Before: 4.07 After: 5.13 Diff: 1.07	Before: 5.20 After: 4.80 Diff: -0.40	Before: 5.13 After: 4.53 Diff: -0.60	Before: 3.80 After: 4.40 Diff: 0.60	Before: 3.07 After: 3.33 Diff: 0.27	Before: 2.93 After: 2.47 Diff: -0.47	Before: 3.46 After: 3.38 Diff: -0.08	Before: 3.87 After: 4.20 Diff: 0.33	Before: 3.99 After: 4.17 Diff: 0.18

## Exhibit 27.B (business alumni)

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
ECON Before - Dealing with the government: regulations, taxes and bureaucracy	Between Groups	25,600	1	25,600	8,162	,005
	Within Groups	276,000	88	3,136		
	Total	301,600	89			
ECON Before - Obtaining funding	Between Groups	10,000	1	10,000	2,654	,107
	Within Groups	331,600	88	3,768		
	Total	341,600	89			
ECON Before - Estimating the technical feasibility, reliability and competitive advantage of the product/service	Between Groups	6,400	1	6,400	2,794	,098
	Within Groups	201,556	88	2,290		
	Total	207,956	89			
ECON Before - The risk of losing personal economic stability	Between Groups	6,944	1	6,944	1,879	,174
	Within Groups	325,156	88	3,695		
	Total	332,100	89			

## Exhibit 27.C (STEM alumni)

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Before - The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Between Groups	9,240	1	9,240	4,569	,035
	Within Groups	206,288	102	2,022		
	Total	215,529	103			
Before - Estimating the technical feasibility, reliability and competitive advantage of the product/service	Between Groups	9,846	1	9,846	3,881	,052
	Within Groups	258,769	102	2,537		
	Total	268,615	103			
Before - Building the team and having a strong professional network	Between Groups	9,240	1	9,240	3,095	,082
	Within Groups	304,519	102	2,985		
	Total	313,760	103			

## Exhibit 27.D (mixed background alumni)

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Before - The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Between Groups	6,533	1	6,533	2,104	,158
	Within Groups	86,933	28	3,105		
	Total	93,467	29			
Before - Building the team and having a strong professional network	Between Groups	8,533	1	8,533	3,117	,088
	Within Groups	76,667	28	2,738		
	Total	85,200	29			
Before - The risk of losing personal economic stability	Between Groups	2,700	1	2,700	,612	,440
	Within Groups	123,467	28	4,410		
	Total	126,167	29			
Before - The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	Between Groups	2,700	1	2,700	,573	,455
	Within Groups	132,000	28	4,714		
	Total	134,700	29			

## Exhibit 28.A and 28.B

### Tests of Between-Subjects Effects

Dependent Variable: Do you think that participating in an incubator had an impact, either positive or negative, on the s

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10,200 <sup>a</sup>	4	2,550	2,825	,036	,204
Intercept	307,025	1	307,025	340,126	,000	,885
HighestAchieved	1,206	1	1,206	1,336	,254	,029
Forhowmuchhaveyouwor kedinyourstartup	1,878	1	1,878	2,081	,156	,045
Gender0male1female	2,070	1	2,070	2,293	,137	,050
Engineering	3,778	1	3,778	4,185	,047	,087
Error	39,718	44	,903			
Total	1295,000	49				
Corrected Total	49,918	48				

a. R Squared = ,204 (Adjusted R Squared = ,132)

**Parameter Estimates**

Dependent Variable: Do you think that participating in an incubator had an impact, either positive or negative, on the start-up level

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	5,747	,304	18,904	,000	5,134	6,360	,890
HighestAchieved	-,182	,158	-1,156	,254	-,500	,136	,029
Forhowmuchhaveyouwor kedinyourstartup	-,108	,075	-1,442	,156	-,258	,043	,045
Gender0male1female	,545	,360	1,514	,137	-,180	1,270	,050
[Engineering=0]	-,586	,286	-2,046	,047	-1,163	-,009	,087
[Engineering=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

**Exhibit 29.A and 29.B**

**Tests of Between-Subjects Effects**

Dependent Variable: Do you think that the presence of one or more persons with a different academic background in

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	19,610 <sup>a</sup>	4	4,902	4,757	,002	,192
Intercept	485,536	1	485,536	471,180	,000	,855
Didyouparticipateinaninc ubatorduringyourstartupe xperience0yes1	3,179	1	3,179	3,085	,083	,037
Forhowmuchhaveyouwor kedinyourstartup	9,114	1	9,114	8,845	,004	,100
HighestAchieved	,720	1	,720	,699	,406	,009
Engineering	3,786	1	3,786	3,674	,059	,044
Error	82,437	80	1,030			
Total	2858,000	85				
Corrected Total	102,047	84				

a. R Squared = ,192 (Adjusted R Squared = ,152)

**Parameter Estimates**

Dependent Variable: Do you think that the presence of one or more persons with a different academic background in your team h

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	5,705	,309	18,438	,000	5,090	6,321	,810
Didyouparticipateinaninc ubatorduringyourstartupe xperience0yes1	,397	,226	1,757	,083	-,053	,846	,037
Forhowmuchhaveyouwor kedinyourstartup	-,126	,042	-2,974	,004	-,211	-,042	,100
HighestAchieved	,093	,111	,836	,406	-,128	,313	,009
[Engineering=0]	,430	,224	1,917	,059	-,016	,877	,044
[Engineering=1]	0 <sup>a</sup>	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

**Exhibit 30.A (STEM alumni) and 30.B (business alumni)**

		STEM alumni	The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Estimating the technical feasibility, reliability and competitive advantage of the product/service	Obtaining funding	Building the team and having a strong professional network	Dealing with the government: regulations, taxes and bureaucracy	The risk of losing personal economic stability	The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	Lack of adequate academic preparation to begin a start-up	The social stigma related to a potential failure	Market and economic uncertainty	Averages
no incub	before		4.96	4.63	4.67	4.54	4.17	4.17	4.42	4.00	2.88	3.18	4.54	4.19
	after		4.42	4.21	5.33	5.13	4.83	4.08	3.96	3.58	2.83	3.23	4.63	4.20
incub	before		4.54	4.25	5.14	4.00	4.43	4.46	3.79	3.29	2.96	2.96	4.50	4.03
	after		3.89	3.46	5.14	4.61	4.25	4.14	3.57	2.93	2.50	2.57	4.18	3.75
incub-non incub	before		-0.42	FALSE	0.48	-0.54	FALSE	FALSE	-0.63	-0.71	FALSE	FALSE	FALSE	
	after		-0.52	-0.74	FALSE	-0.52	-0.58	FALSE	FALSE	-0.65	FALSE	-0.66	-0.45	
no incub incub	after-before		-0.54	-0.42	0.67	0.58	0.67	-0.08	-0.46	-0.42	-0.04	0.05	0.08	0.01
	after-before		-0.64	-0.79	0.00	0.61	-0.18	-0.32	-0.21	-0.36	-0.46	-0.39	-0.32	-0.28

Business alumni		The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Estimating the technical feasibility, reliability and competitive advantage of the product/service	Obtaining funding	Building the team and having a strong professional network	Dealing with the government: regulations, taxes and bureaucracy	The risk of losing personal economic stability	The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	Lack of adequate academic preparation to begin a start-up	The social stigma related to a potential failure	Market and economic uncertainty	Averages
no incub	before	4.25	4.17	4.54	4.29	4.50	4.54	4.33	3.50	3.17	3.75	3.83	4.08
	after	4.33	4.50	4.79	4.46	5.25	4.67	4.46	3.75	2.92	3.44	3.92	4.23
incub	before	4.48	4.48	4.67	4.81	3.57	3.71	3.81	3.62	3.43	2.94	3.71	3.93
	after	4.86	5.24	5.81	5.10	5.00	4.76	4.57	4.10	3.38	3.53	4.38	4.61
incub-non incub	before	FALSE	FALSE	FALSE	0.52	-0.93	-0.83	-0.52	FALSE	FALSE	-0.81	FALSE	
	after	0.52	0.74	1.02	0.64	FALSE	FALSE	FALSE	FALSE	0.46	FALSE	0.46	
no incub	after-before	0.08	0.33	0.25	0.17	0.75	0.13	0.13	0.25	-0.25	-0.31	0.08	0.15
incub	after-before	0.38	0.76	1.14	0.29	1.43	1.05	0.76	0.48	-0.05	0.59	0.67	0.68

Exhibit 31.A and 31.B

ANOVA

After - Estimating the technical feasibility, reliability and competitive advantage of the product

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7,154	1	7,154	2,732	,105
Within Groups	130,923	50	2,618		
Total	138,077	51			

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.	
After - The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Between Groups	3,546	1	3,546	1,604	,211
	Within Groups	110,512	50	2,210		
	Total	114,058	51			
After - Building the team and having a strong professional network	Between Groups	3,466	1	3,466	1,102	,299
	Within Groups	157,304	50	3,146		
	Total	160,769	51			
After - Dealing with the government: regulations, taxes and bureaucracy	Between Groups	4,397	1	4,397	1,142	,290
	Within Groups	192,583	50	3,852		
	Total	196,981	51			
After - Market and economic uncertainty	Between Groups	2,576	1	2,576	,922	,342
	Within Groups	139,732	50	2,795		
	Total	142,308	51			

Exhibit 32.A (all), 32.B (business alumni) and 32.C (STEM alumni)

Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1,138	,264		4,310	,000	,617	1,658		
	Scenario 1	4,473	,427	,642	10,486	,000	3,632	5,314	,674	1,484
	scenario3	2,326	,377	,406	6,176	,000	1,584	3,069	,586	1,707
	scenario4	1,662	,388	,276	4,284	,000	,897	2,427	,608	1,644
	scenario5	3,631	,384	,614	9,458	,000	2,874	4,388	,601	1,665
	scenario6	1,670	,384	,282	4,349	,000	,913	2,427	,601	1,665
	scenario7	3,831	,364	,707	10,510	,000	3,112	4,549	,559	1,787
	scenario8	1,862	,373	,330	4,988	,000	1,126	2,598	,579	1,728

a. Dependent Variable: Score

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,100	,482		2,281	,025		
	Scenario 1	4,186	,631	,773	6,629	,000	,493	2,027
	scenario3	2,445	,666	,408	3,670	,000	,542	1,843
	scenario4	1,733	,653	,300	2,655	,010	,524	1,907
	scenario5	3,718	,666	,621	5,580	,000	,542	1,843
	scenario6	1,186	,752	,162	1,578	,118	,638	1,568
	scenario7	3,362	,641	,602	5,241	,000	,508	1,968
	scenario8	1,650	,653	,286	2,527	,013	,524	1,907

a. Dependent Variable: Score

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,235	,331		3,735	,000		
	Scenario 1	3,654	,562	,546	6,499	,000	,716	1,397
	scenario3	2,336	,492	,424	4,746	,000	,634	1,578
	scenario4	1,765	,544	,277	3,247	,002	,697	1,436
	scenario5	3,515	,514	,597	6,835	,000	,663	1,509
	scenario6	1,765	,475	,339	3,715	,000	,609	1,643
	scenario7	4,303	,502	,757	8,564	,000	,648	1,544
	scenario8	1,611	,502	,283	3,206	,002	,648	1,544

a. Dependent Variable: Score

**Exhibit 33.A and 33.B**

		The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Estimating the technical feasibility, reliability and competitive advantage of the product/service	Obtaining funding	Building the team and having a strong professional network	Dealing with the government: regulations, taxes and bureaucracy	The risk of losing personal economic stability	The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	Lack of adequate academic preparation to begin a start-up	The social stigma related to a potential failure	Market and economic uncertainty	Averages
All	Before	4.40	4.29	4.83	4.34	4.33	4.37	4.04	3.52	3.07	3.22	4.13	4.05
	After	4.34	4.27	5.23	4.85	4.80	4.41	4.14	3.52	2.82	3.18	4.26	4.17
Econ	Before	4.36	4.31	4.60	4.53	4.07	4.16	4.09	3.56	3.29	3.33	3.78	4.01
	After	4.58	4.84	5.27	4.76	5.13	4.71	4.51	3.91	3.13	3.48	4.13	4.41
STEM	Before	4.73	4.42	4.92	4.25	4.31	4.33	4.08	3.62	2.92	3.07	4.52	4.11
	After	4.13	3.81	5.23	4.85	4.52	4.12	3.75	3.23	2.65	2.89	4.38	3.96
All Students		4.67	4.72	5.64	4.77		5.56	3.87	4.31		3.77		4.66
	Econ	4.57	4.68	5.59	4.74		5.48	3.81	4.33		3.74		4.62
	Engi	4.94	4.83	5.78	4.83		5.75	4.04	4.25		3.83		4.78
		The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	Estimating the technical feasibility, reliability and competitive advantage of the product/service	Obtaining funding	Building the team and having a strong professional network	Dealing with the government: regulations, taxes and bureaucracy	The risk of losing personal economic stability	The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	Lack of adequate academic preparation to begin a start-up	The social stigma related to a potential failure	Market and economic uncertainty	Averages
All	before	0.27	0.44	0.81	0.43		1.19	-0.17	0.79		0.55		0.62
	after	0.34	0.45	0.41	-0.08		1.14	-0.27	0.79		0.59		0.50
Econ	before	0.21	0.37	0.99	0.21		1.32	-0.28	0.78		0.41		0.61
	after	-0.01	-0.17	0.32	-0.01		0.77	-0.71	0.42		0.26		0.21
STEM	before	0.21	0.41	0.85	0.58		1.42	-0.04	0.63		0.77		0.68
	after	0.81	1.03	0.55	-0.01		1.63	0.29	1.02		0.94		0.82
All	before	FALSE	FALSE	0.81	FALSE	FALSE	1.19	FALSE	0.79	FALSE	FALSE	FALSE	0.62
	after	FALSE	FALSE	FALSE	FALSE	FALSE	1.14	FALSE	0.79	FALSE	0.59	FALSE	FALSE
Econ	before	FALSE	FALSE	0.99	FALSE	FALSE	1.32	FALSE	0.78	FALSE	FALSE	FALSE	0.61
	after	FALSE	FALSE	FALSE	FALSE	FALSE	0.77	-0.71	0.42	FALSE	FALSE	FALSE	FALSE
STEM	before	FALSE	FALSE	0.85	0.58	FALSE	1.42	FALSE	0.63	FALSE	0.77	FALSE	0.68
	after	0.81	1.03	FALSE	FALSE	FALSE	1.63	FALSE	1.02	FALSE	0.94	FALSE	0.82

## Appendices

### Appendix 1

This is page 1 out of 4 of the survey

What is your academic and university background?

Business/economics/finance

Engineering or any STEM subject

Mixed (e.g. Bachelor in engineering and MBA in business)

What is your highest level of education achieved?

Bachelor

Master of Science

Other Post Graduate (e.g. MBA)

PhD

Gender

Male

Female

Age (in numbers)

Are you Italian or non-Italian?

Italian

Non-Italian (please specify in the text entry box)

At what age (in numbers) did you start working in the start-up?

Did you have in your start-up team, for a significant amount of time, at least a person with another academic/university background?

Yes

No

Did you participate in an incubator during your start-up experience?

Yes

No

Are you still working in the start-up?

Yes

No

Part-time/as an external consultant

I prefer not to answer

Please rate the **severity that you perceived** regarding the following issues both **BEFORE** the beginning of your start-up experience and **AFTER** the launch of the venture (that is, the **ACTUAL OBSTACLES** that were encountered during the start-up phase being in progress), on a scale from 1 to 7.

References are:

1 - not an issue; 4 - a medium level issue ; 7 - a major issue

	Before							After						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
The capacity and chance of spotting an opportunity and estimating the potential economic value of the venture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Estimating the technical feasibility, reliability and competitive advantage of the product/service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obtaining funding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Building the team and having a strong professional network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dealing with the government: regulations, taxes and bureaucracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The risk of losing personal economic stability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The potential personal constraints of becoming an entrepreneur (time and effort required) and the availability of other career options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The perception of one's own abilities and traits (for example, the risk taking behaviour) as not matching those of an entrepreneur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of adequate academic preparation to begin a start-up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The social stigma related to a potential failure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Market and economic uncertainty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Optional: other(s) (please indicate to what extent this represented a severe issue both before and after, with a number from 1 to 7 as the scale above):

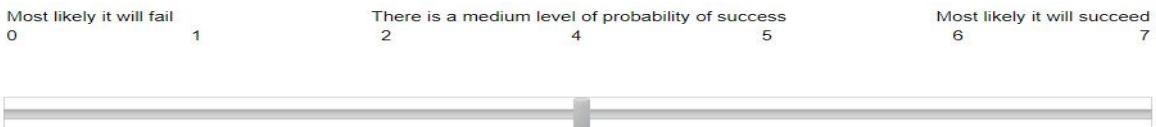
You will now be presented with two brief scenarios regarding **two tech start-ups** located in the same geographical area, in their **early stage**. Both teams of founders are willing to put a strong commitment into their start-up.

Despite offering different products and services, their respective business models have been reviewed by financial and business experts and have been considered sustainable and scalable on a very similar level.

The two start-ups possess respectively the following characteristics:

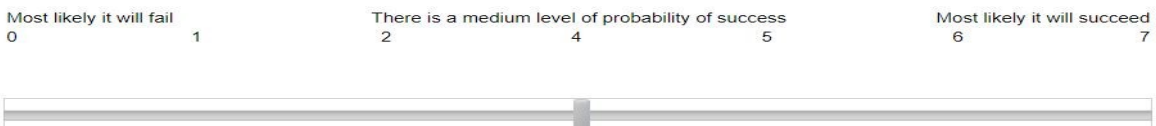
- The reliability and technical superiority of the product has been proven.
- Has already collected the funds that it requires.
- The team has shown weak soft skills, in terms of communication, teamwork and negotiation capabilities.

Please rate from 1 to 7 this start-up success' probability:



- The reliability and technical superiority of the product has not yet been proven.
- Has already collected the funds that it requires.
- The team has shown weak soft skills, in terms of communication, teamwork and negotiation capabilities.

Please rate from 1 to 7 this start-up success' probability:



How important do you think is having a strong network for a start-up to succeed?

Not important at all 0 1 2 3 4 Moderately important 5 6 7 Extremely important



Do you think that the presence of one or more persons with a different academic background in your team had an impact, either positive or negative, on the start-up development process?

Very negative impact 1 2 3 4 No impact 5 6 7 Very positive Impact



Do you think that the presence in the team of that/these person(s) covered some important skills for the start-up development, either soft or hard, that were lacking from your academic background?

No skills 1 2 3 4 Some skills 5 6 7 Many skills



Did you notice different visions with people having a different academic background, especially regarding the perception on the severity of the obstacles faced by the start-up during its development?

No differences 1 2 3 4 A few differences 5 6 7 Many differences



Do you think that participating in an incubator had an impact, either positive or negative, on the start-up development process?

Very negative impact 1 2 3 4 No impact 5 6 7 Very positive Impact



Do you think that the experiences and training that you had in the incubator taught you some important skills, either soft or hard, for the start-up development that were lacking from your academic background?

No skills 1 2 3 4 Some skills 5 6 7 Many skills







methodology section, all quantitative data has been gathered through a 1-7 Likert scale. For an overview of the survey structure, please refer to appendices 1 and 2.

### **The items in the first survey**

The first survey is divided into three main sections.

The first part gathers the demographic and background data of the participants. This includes the current field of study, the gender, age, nationality, and whether at least one close relative is self-employed. These data give the opportunity to have a comprehensive background on multiple aspects that are useful for an effective profiling. Indeed, some variables are extremely important that are considered, since, as we saw in the literature review section, they have deep influence in terms of entrepreneurial orientation. In particular, I am referring to the gender gap and potentially the nationality. For example, if we consider that most engineers are male, and men have greater propensity towards entrepreneurship, this factor has to be accounted for in order to avoid biases.

At the end of this section, it is also asked to the respondents to provide the major obstacles that they perceive to prevent the undertaking of a career in entrepreneurship. It is also specified that the entrepreneur is to be considered as looking towards to develop his/her business in an innovative sector, and as holding a degree in the same field of study of the respondent and that this definition will last throughout the whole survey. This question provides an opportunity to determine what they first think in terms of being the most influential obstacles, without biases derived by influences and indirect suggestions by further questions presented. Being an open-ended question, it has the remarkable feature to measure and test the degree of homogeneity of responses in a setting of relatively total freedom of expression. This may confirm in a very straightforward and direct way whether students picture in their mind the same obstacles or not.

The second section relates to the orientation with respect to a career as an entrepreneur. This has been divided into three main questions. First, the degree to which the respondent ever thought about choosing this career path. This is to be deemed as the essential basic step in terms of entrepreneurial orientation, that is, to consider it as a potential career choice in the first place. Then, as a further step, respondents are asked whether they ever documented themselves on starting a new venture of their own. It is expected that the rate of positive answers will be relatively lower than the first one, as it may be considered as a second stage

funnel. It is worth noticing that to compare the actual and measurable effort in the process of getting informed and document is of relative importance. Indeed, even if there is a disparity in terms of benchmarking levels, what really is important is their own perceived effort and extent reached through the process. The third question asks whether the respondent, on general terms, would rather be an employee or an entrepreneur. This question is of interest to understand whether students from a given subject area have a consistent relative preference for the career path of the entrepreneur than the other. Here again, some positive correlation was expected with respect to the first question, but no clear correlation with the second one, as a person may have documented him/herself to understand that it is not his/her preferred professional path. In general, this section tries to uncover the entrepreneurial propensity at different levels of stage and depth, from the basic consideration up to the personal preference in terms of potential career choice.

The third section presents to the candidate twelve closed items to be evaluated. These are selected major obstacles related to the founding of a new venture. They can be classified with respect to two dimensions, that is, whether an obstacle is related relatively more to the soft or hard skills (i.e. related to more technical elements) dimension and whether an obstacle is more endogenous or exogenous in nature. It is worth acknowledging that none of these obstacles is endowed with a pure category belonging, as for example none of them is exclusively endogenous in nature since external influences are always present. However, a general tendency can be considered and to obviate this problem also mixed category classifications will be considered.

Some of these have an endogenous profile (namely, the personal constraints, the economic stability, traits which mirror the self-perception of being a person that may fit the entrepreneurial career path) while the remaining ones have an exogenous profile (namely dealing with the government, the market uncertainty, the lack of academic preparation, the social stigma related to failure). Moreover, a further distinction can be made between the items that have a technical profile (estimating the technical feasibility) and those with a soft skills profile (the process of building a team and a strong network, which mirrors the elements belonging to the area of skills related for example to the ability of handling the relationships with multiple stakeholders, or giving business presentations *et cetera*).

As noted before, some other items can be considered as mixed, and thus, hybrid and in between in nature, namely the collection of funds, which comprises elements of both endogenous and exogenous profile as well as hard and soft skills involvement. A graphical

representation of the subdivisions into the cited categories can be found at *Exhibit 1*. The perceived severity of a lack of professional experience was not included into the items. This is because its answer would be extremely case specific, as some students may have had more professional experience than others, and potentially in strongly different business environments and positions. On the other hand, the education at university, especially since the target sample is drawn from the very same university for each subject area, is relatively more homogeneous than the wide range related to the potential work experiences. This last section perhaps offers the most easily interpretable overview to spot consistent differences in terms of expected level of severity of the obstacles. An attention checker, with a specific value to be selected, has been placed at the end of this section to ensure the accuracy of the answers. Those questionnaires that were filled-in with an incorrect value for this specific item were excluded altogether from the analysis. In addition, and more generally, all unfinished and partial responses or clear outliers were excluded from the analysis, to preserve the quality of the data utilized.

### **The items in the second survey**

As in the first survey, the first section gathers the background and demographic data of the participants. This includes firstly the academic background, which includes also the “mixed” answer option (that is, with a cycle of study in both a STEM and business subject), and secondly the highest level of education achieved, ranging from bachelor, master, MBA up to the PhD level. The next part of the section inquires the general demographic data of the participants, such as age, gender and nationality. The last part refers to the respondents’ background in terms of entrepreneurial experience. More in detail, it asks three questions. First, whether the respondent had in his/her team, for a significant amount of time, at least one person with another university background. Second, whether he/she participated in an incubator program. Third, if he/she is still working in his/her start-up, with the option choice of not disclosing this piece of information, since it may be deemed as a sensitive detail. The first two of this set of questions will be used to ensure that only the respondents with relevant experiences will be presented with more in-depth items on the matters.

The second section inquires the perceived severity of the same obstacles proposed to the students in their respective second section. However, in this case it is asked to evaluate them both before the launch of the venture and after the launch, or in other words, the actual

encountered level of severity of those obstacles. At the end of this section, the respondents were provided with the possibility to express in an open question the other potential obstacles encountered following the same scale of measure previously applied.

The third section presents to the respondent two randomized scenarios, each with a related quantitative question. Entrepreneurs are presented with different scenarios and their evaluation signal, and possibly confirm, their assessment regarding their perception on the severity of the cited issues under study. The focus is specifically on three main issues, the technical aspect of providing a product/service, the soft skills of the founding members and the funding. More in detail, the header description explains to the respondent that there are two tech start-ups, located in the same geographical area, in their early stage. In addition, it is described that both teams of founders are willing to put a strong commitment into their ventures, and that despite offering different products and services, the two respective business models have been reviewed by financial and business experts and that have been considered sustainable and scalable on a similar level. This introduction is meant to ensure a background description of the scenarios, and especially to create homogeneity between them aside from just three main dimensions, which are those that are randomized.

The first of these three elements is the degree of certainty and proof regarding the technical superiority and reliability of the product and/or service offered. The second one relates to the obtainment or not of the funds required. The third covers the level of strength of the soft skills of the founding team, in terms of communication, teamwork and negotiation skills. This tool will help in verifying, and potentially confirm, in an indirect way the same perception regarding the level of severity of these three major obstacles.

The fourth and last section covers some of the mediating and complementary aspects to the launch of a new venture. The first question focuses on the perceived importance of having a strong network to succeed, ranging from no importance up to extreme importance. The remaining questions' visibility are dependent on the answers provided in the first section. In fact, the first set is visible only to those who have indicated that in their founding team they had also at least another colleague with a different academic background.

The first of this set of questions specifically asks whether they felt that having a person with a different background had a positive, negative or no impact on the start-up development

process. The second one inquires whether the respondent perceived that having a person with a different background covered or not some important skills of any nature (either soft or hard) that was missing from his/her own background. The third, and last one concerning the diversity in terms of background of the team composition, concerns the perceived level of difference of visions, especially related to the perceived severity of the obstacles faced during the start-up during its development. This first set allows us to understand the perception with respect to the presence of a team member with a different background under different and complementary aspects.

The second set is visible only to those who have answered positively to the question regarding whether he/she attended an incubator program. It comprises of two questions. The first asks whether the respondent perceived as impactful, either positive or negative or no impact, the experience in the incubator. The second question inquires whether the experience, training and mentorship received taught him/her some skills of any nature (soft and/or hard), for the start-up development that were lacking from his/her academic background. These two sets of questions will provide some useful insights regarding the perception of efficacy regarding the mediating factors under analysis.