UNIVERSITÀ POLITECNICA DELLE MARCHE
FACOLTÀ DI ECONOMIA "GIORGIO FUÀ"

Master's Degree in International Economics and Commerce

HOCHSCHULE HEILBRONN
FAKULTÄT WIRTSCHAFT UND VERKEHR

Master's Degree in Business Management

An empirical analysis of the factors that influence the success of the incubation process

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Academic Year 2020/2021

To you who have left your safe haven,

navigating the worst of waters,

so I may be here today

ABSTRACT (Versione Italiana)

Al giorno d'oggi le startup sono il vero motore dello sviluppo economico dei paesi poiché creano nuovi posti di lavoro altamente qualificati e garantiscono innovazione tecnologica. Infatti, la parola startup può essere definita come l'essenza del pensiero non convenzionale, della creatività e dell'originalità che sono considerati come prerequisiti per il ringiovanimento dei paesi. Per esempio, in Italia negli ultimi sei mesi, ci sono 11.899 start-up, il 3,2% di tutte le imprese di nuova costituzione.

La correlazione tra la creazione di piccole imprese e lo sviluppo economico delle nazioni sta nel fatto che le PMI rappresentano la maggior parte del numero di imprese nei paesi europei. Così, il miglioramento del settore delle PMI migliora la produttività, la concorrenza e la generazione di occupazione, così come la coesione sociale. Ma, di fatto, le piccole imprese sono più soggette a fallimenti rispetto alle grandi aziende, soprattutto nelle prime fasi di esistenza. Per esempio, Startup Genome sottolinea che 9 startup su 10 tendono a fallire in un arco di tempo che va da 1 a 3 anni.

Alcuni studiosi sostengono che le forze di selezione che eliminano le imprese non competitive siano sufficienti a garantire un ambiente commerciale efficiente e competitivo. Tuttavia, per ridurre la probabilità di fallimento delle imprese c'è bisogno di creare istituzioni forti che aiutino il progresso economico,

specialmente sviluppando il settore delle PMI, che rappresenta la maggioranza delle aziende nel panorama imprenditoriale italiano. In questo contesto, l'incubazione d'impresa è da sempre utilizzata come strumento politico per aumentare il bacino di nuove imprese e affrontare le loro esigenze dalla fase iniziale e vulnerabile della loro esistenza, in modo che diventino autonome per affrontare la competitività del mercato. Gli incubatori attuano un processo di incubazione che inizia con una fase di selezione in cui si considerano solo le imprese degne di sostegno, e termina con il loro lancio sul mercato, assicurando che abbiano più valore di quello con cui sono entrate nel processo di incubazione. Ciò che diventa interessante nello studio degli incubatori d'impresa, però, è trovare una formula che consenta di capire come si assicura il successo di un incubatore nel sostenere le startup. Infatti, questa tesi, grazie ad una dettagliata revisione della letteratura e alla costruzione di un modello empirico ha lo scopo di identificare i fattori chiave che influenzano il successo degli incubatori.

In primo luogo, ho definito il processo di incubazione e come esso influisce sulla performance dell'impresa, attraverso una revisione completa della letteratura. Poi, attraverso la raccolta e l'interpretazione dei dati, e quindi un'analisi di regressione, il modello è stato testato al fine di scoprire quali siano le caratteristiche chiave che fanno la differenza tra gli incubatori, in termini di supporto alle startup. Infine, ho studiato empiricamente se sussista ancora una differenza tra incubatori privati e pubblici nel sostenere le startup.

ABSTRACT (English version)

Nowadays startups are the real engine for the economic development of countries since they create new highly skilled jobs and ensure technological innovation. In fact, the word startup can be labeled as the essence of unconventional thinking, creativity, and originality which are considered as prerequisites to the rejuvenation of countries. For instance, in Italy during the past six months, there are 11,899 start-ups, 3.2% of all newly incorporated companies.[1] (Mise, 2021)

The correlation between the creation of small businesses and the economic development of nations stands in the fact that SMEs represent most of the number of enterprises in the European countries. Thus, improving the SMEs sector improves productivity, competition, and employment generation, as well as social cohesion.

But, as a matter of fact, small businesses are more subject to failures with respect to big companies, especially in the first stages of existence. Startup Genome[2] points out that 9 out of 10 startups tend to fail to 1-3 years. (2019)

Some scholars argue that the selection forces that eliminate uncompetitive firms are enough for ensuring an efficient and competitive business environment.

[1] Mise (2021) **Startup innovative: tutti i dati al 1° gennaio 2021**.
Available at: https://www.mise.gov.it/index.php/it/198-notizie-stampa/2041934-startup-innovative-tutti-i-dati-al-1-gennaio-2021

[2] Startup Genome (2019**) Global Startup Ecosystem Report 2019** with New Life Sciences Ecosystem Ranking

However, to reduce the likelihood of venture failures there is a need of establishing strong institutions that help economic progress, especially by developing the SMEs sector, which represents the majority of companies in the Italian business landscape. In this context, business incubation has been used as a policy tool to increase the pool of new businesses and address their needs from the initial and vulnerable stage of their existence, so that they become autonomous to face market competitiveness. Incubators implement an incubation process that begins with a selection phase in which only businesses worthy of support are considered, and ends with their launch into the market, ensuring that they have more value than they entered the incubation process with. What becomes interesting in the study of business incubators, however, is finding a formula for how an incubator's success in supporting startups is assured. In fact, this thesis, through a detailed literature review and the construction of an empirical model aims to identify the key factors that influence the success of incubators.

At greater length, I firstly defined the incubation process and how it affects the firm performance, through a comprehensive literature review. Then, through the collection and interpretation of data, and then a regression analysis, the model is tested to find out which are the key characteristics that make a difference between incubators, in terms of startup support. Finally, you can find a study on whether there is still a difference between private and public incubators in supporting startups.

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INTRODUCTION

With my dissertation, I would like to study what leads to the success of incubators in the intrinsic support of startups. To do this, in a preliminary step, I studied the incubation process, listing all the various activities and services offered by incubators to startups. Specifically, the main questions are: is the factor on which the difference in performance of incubators is based the fact that they are public or private? Or are they more or less successful due to the fact that they offer one service over another?

The relevance of the research topic lies in the fact that the innovation market is constantly growing and, in this context, incubators, whose number in the market is growing more and more, represent mechanisms at the center of innovation.

The fact that more and more incubators are springing up suggests a well-entrenched need to receive support from them in the innovation landscape. Indeed, they stand in the middle between the countless new ideas of startups and the market where they can be sold, playing a key role in countries' economy.

The question that arises in this situation is how these can be deemed successful. For instance, how do we evaluate a successful incubator? We can't just look at the balance sheet, because thanks to the fact that they support other organizations, their business object is not just achieving a certain amount of annual profit and is not measurable with KPIs. For this reason, it is not enough to look at the balance

sheet as one would with classical businesses. Indeed, the literature talks about different performance measures, such as Hackett and Dilts' study that will analyze in depth.

Therefore, the contribution to existing studies that I would like to make is both to see if there are any measures that are relatable to incubation process success and to understand if there are any performance measures that make a difference between different types of incubators.

Thus, to test the correlation between performance measures and incubation process success, I constructed a regression model, using data taken from a questionnaire. However, as will be detailed later, I did not consider all of the performance measures listed in the literature in the test, as many of them are part of the activities that are basically provided within the incubation process. As such, in order to define what the basic activities are, there is the need to first define what incubators are and secondly how an incubation process can be explicated, through the following literature review.

1. LITERATURE REVIEW

As mentioned in the introduction, the growing popularity of business incubators (BI) requires a detailed look at what the incubation process is and how it is articulated. For this reason, numerous studies have been conducted to define what incubators are and how an incubation process is put in place.

To introduce you to this literature review, I would like to first draw the conceptual map. The rationale on which I based the outline of definitions starts with the definition of incubators, followed by the definition of the incubation process and ending with the definition of who is a potential incubatee, including the concept of business performance to assess the success of businesses exiting the process. As a result, this pathway is designed to assess what the literature considers a measure of an incubator's success in supporting startups.

Thus, the aim of this literature review is to firstly describe what the incubation process is and then understand how it influences firm performances. Afterwards, the attention is drawn to what kind of business performance indices are influenced (Figure 1.1).

Figure 1.1. Incubator-incubation concept map.

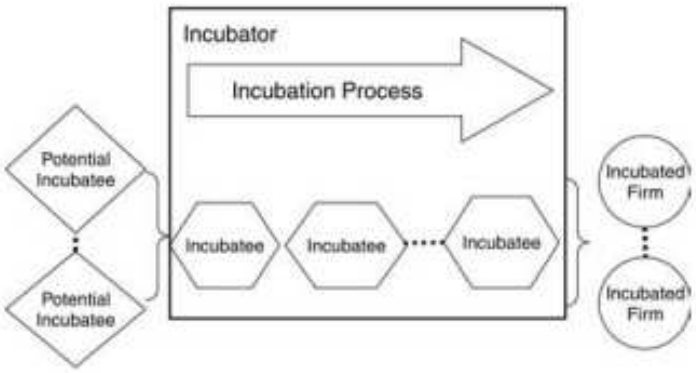

Figure 1. Incubator-incubation concept map.

Source: David Dilts (2004)

1.1 Business incubators definition

Prior to outline what the incubation process is and how it works, this section defines the concept of business incubators and discerns the different types of business incubators that operates in the entrepreneurial environment.

Phan et al (2005) [3] and Akçomak (2009)[4] define business incubators as institutions that speed up the growth and the financial and operational stability of

[3] Phan H.P., Siegel D.S., Wright M. (2005). **Science parks and incubators: observations, synthesis and future research**. Journal of Business Venturing 165 – 182. Available online at www.sciencedirect.com

startups by offering them targeted services and support; creating an environment which helps start-ups dealing with the challenges of entrepreneurship; and putting emphasis on the knowledge agglomeration, resource sharing, innovativeness, and competitiveness (Phan H.P, Siegel D.S., Wright M., 2005) (Akcomak, 2009).

This first definition might seem complete but in my opinion is missing a fundamental notion, which will be then strongly discussed in the empirical model, namely that of networking activities.

While, the study of Weinberg et al (1991)[5], although it is older and the definition of incubator is less comprehensive than previous ones, adds the concept of networking by seeing incubators as inter-organizational or social partnership organizations that are concerned with addressing socially relevant purposes by exploiting the strength from diverse organizations (Winberg M.L., Allen D.N., Schermerhorn J.R., 1991).

As last definition, I took the Bøllingtof and Ulhøi (2005)[6] study that, with the intention to concretize the networking concept, describes business incubators as a kind of infrastructures geared to support and nurture the establishment and development of small and medium-sized enterprises, thanks to the territorial

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[4] Akçomak S. (2009) **Incubators as Tools for Entrepreneurship Promotion in Developing Countries**. United Nations University. Maastricht Economic and social Research and training centre on Innovation and Technology.

[5] Weinberg, M. L., Allen, D. N., & Schermerhorn, J. R. (1991). **Interorganizational challenges in the design and management of business incubators**. Policy Studies Review, 149–160.

[6] Bøllingtoft, A., & Ulhoi, J. P. (2005). **The networked business incubator - leveraging entrepreneurial agency?** Journal of Business Venturing, 265–290

synergy, physical proximity, and relational symbiosis. (Bollingtoft A., Ulhoi J.P., 2005)

Therefore, reworking a definition to identify what incubators are, I can state that this term is seen as an umbrella to describe different types of organizations that provide access to physical and virtual space, networking activities and value-adding services – like expertise in technical and managerial matter – to small and medium enterprises, with the main objective of increasing innovativeness, competitiveness, and efficiency in the business environment.

1.1.1. Classification and identification of different types of incubators

Classifying incubators is not straightforward, in fact literature studies prove that, above all, the types of incubators change according to their geographical location. Indeed, even inside the same continent, we can find differences among countries. For this reason, I picked up the study of Grandi and Grimaldi (2005) which, while assessing incubating models, figured out four main different types of incubators in Italy: Business Innovation Centers (BICs), University Business Incubators (UBIs), Independent Private Incubators (IPIs), and Corporate Private Incubators (CPIs). (Grimaldi R., Grandi A., 2005)[7]

[7] Grimaldi R., Grandi A. (2005) **Business incubators and new venture creation: an assessment**

Starting with BICs (Business Innovation Centers), their origin dates back to 1984, with the European Commission setting up the first BIC. Their activities consist in offering basic services, including the provision of space, infrastructure, communication channels and information about financial opportunities.

The University Business Incubators (UBIs) are born because policymakers more and more frequently ask universities to lend resources, time and talents to the business environment. For this reason, they provide contribution with patentable inventions, faculty spin-offs and technology transfers. So, UBIs are institutions that provide support and services to knowledge-based ventures, with an emphasis on the transfer of technological knowledge. There are two main categories of services offered by UBIs. The typical ones include shared office services, business assistance, access to capital and business networks. While the university-related services include the provision of faculty consultants, student employees, university image conveyance, library services, labs/workshop and equipment, mainframe computers, R&D activities, technology transfer programs, employee education and training and other social activities.

Shifting the focus to private incubators, we can talk about IPIs (Individual Private Incubators) and CPIs (Corporate Private Incubators), that both have the purpose of creating new ventures and make money in several ways, from charging service fees to taking a percentage of revenues from the incubated companies or taking a

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of incubating models. Technovation, 111–121 Available online at www.sciencedirect.com

portion of equity in the new venture. Their objective is to help companies providing pre-seed, seed and other investments traditionally offered by business angels or early-stage venture capitalists and provide business guidance. The key services offered include efficient completion of business models, validation and vetting, provision of experienced operational staff, recruitment mechanisms, instant infrastructure, networks of relationships with key strategic players; access to a network of domain experts for all aspects of the business, including validation and concept building; and provision of technology to accelerate product development or support.

Moving on to the description of the two different categories, Corporate Business Incubators are owned and set up by large companies with the objective of supporting the emergence of new business units, often called corporate spin-offs, that are commonly the result of a diversification strategy. Indeed, these incubators can also host more generic start-ups. They generally intervene during the early stages of the business development cycle, for instance in the business concept definition.

IPIs (Individual Private Incubators) are set up by single individuals or group of individuals that want to help entrepreneurs to grow their business. They usually do not intervene in the early stages of the business development but invest their own finances in the new companies. They are often called accelerators since they

intervene when the business has been launched and needs some specific capital or know-how injection.

As can be easily noticed – over time the attention of incubators, particularly the private ones, shifted the focus on the provision of more intangible and high-value services. As a matter of fact, traditionally the objective of incubators was to provide logistical services, to reduce the startup costs for new ventures and to provide local visibility for emerging business. While now, the focus of more recent private incubating experience seems to be on shortening the time-to-market, providing more specialized services, and bringing start-ups, technological and commercial big players into a network. They also monitor their incubatees providing day-by-day operational support, and access to advanced sources of technical and management expertise.

Getting to the main point, Grimaldi and Grandi (2005), identified two different models of incubation.

On the one hand, the first model is composed by public BCIs, some UBIs and regional incubators whose services are oriented towards the provision of tangible assets and traditional services, with the objective of helping companies to access funding and competences and creating a supportive atmosphere for entrepreneurial initiatives.

The second model is composed by private incubators (CPIs and IPIs), and some UBIs, whose services are oriented towards the provision of finance, intangible and

specialized assets and services, with a short-term orientation. The main difference is that private incubators play an active role in the connection and networking activities, thus facilitating the flow of knowledge and talent among companies, with the result of increasing the general efficiency of the business environment. While the public support can be defined as passive, meaning that the support is given if and only if it is asked by the startup.

In fact, the first model, even though concretely support startups in reducing operating costs, it does not respond to the requirement of business consultancy, education and training of employees and employers, but mainly does not provide a link between the company and business advisors, investors, and other entrepreneurs.

University Business Incubators could be placed in both models. Their incubating model is similar to the public ones, since they rely on incubatees fees and public subsidies. Besides, they do not solve problems related to provision of financial capital and of advanced management and financial competencies. But their main objective is to provide knowledge-based companies with access to technological competencies, human capital and academic infrastructures and networking. Thus, considering the networking aspects, we can assert that they fit more to the second model of incubation, since they are basically more like private incubators.

In the Table 1.1, I listed all the possible services offered and the four categories of incubators which confirm what has just been discussed.

One necessary clarification is that from the table we can notice that private incubators do not provide the service of faculty consultants, student employees and disposable library for startups, but this gap can be solved by connecting the incubator to the local university environment where it operates, like higher education and research institutions, through networking activities.

Table 1.1 Types of incubators and offered services

		Types of incubators			
		BICs	UBIs	CPIs	IPIs
offered services	space	✓	✓	✓	✓
	infrastructure	✓	✓	✓	✓
	communication channels	✓	✓	✓	✓
	financial information	✓	✓	✓	✓
	local visibility	✓	✓	✓	✓
	rent breaks	✓	✓	✓	✓
	access to capital	✗	✓	✓	✓
	business networks	✗	✓	✓	✓
	business assistance	✗	✓	✓	✓
	faculty consultants	✗	✓	✗	✗
	student employees	✗	✓	✗	✗
	library services	✗	✓	✗	✗
	R&D activities	✗	✓	✓	✓
	technology transfer	✗	✓	✓	✓
	employee education and training	✗	✓	✓	✓
	management expertise	✗	✗	✓	✓
	change management	✗	✗	✓	✓
	provision of technology	✗	✗	✓	✓
	support in product development	✗	✓	✓	✓

Source: author's elaboration

While in Table 1.2 you can find another way to distinguish incubators and understand the differences between them, and it is based on the incubators' characterizing variables. This system has been developed by Grimaldi and Grandi (2005) in the study of eight Italian incubators belonging to the four categories.

Table 1.2. Types of incubators and their characterizing variables

		Types of incubators			
		BICs	**UBIs**	**CPIs**	**IPIs**
Incubators' characterizing variables	**Institutional mission/strategy**	non-profit	non-profit	profit	profit
	Industrial sector	generic	university	specific	specific
	Location	areas in renewal process	close to university	industrial estate	industrial estate
	Market	regional	regional/ national	national/ international	national/ international
	Origin of ideas	external	internal	internal	external
	Phase of intervention	early stages	early stages	until independence	until independence
	Incubation period	long run	long run	short run	short run
	Sources of revenue	public funding & pay-per-use	public funding & pay-per-use	fees and equity	fees and equity
	Services offered	tangible	tangible and intangible	intangible	intangible
	Management teams	intermediaries	intermediaries	direct involvement	direct involvement

Source: author's elaboration

Through the first variable – the institutional mission – we can distinguish between profit-oriented and non-profit incubators. The BICs and UBIs are no-profit institutions, while CPIs and IPIs are profit-oriented.

The industrial sector indicates if the incubator works in the same industry or if it attracts startups in different but related industries. The more specific is the range of action, the better the incubator can leverage its competences and create synergies among the incubated startups. Public incubators operate in different industries, UBIs operate in the university-related sectors, while the private ones generally focus their attention on certain competitive environments or particular technologies.

The location variable is related to the first two ones, in fact public incubators – being no-profit and operating in general sectors – focus their attention on the revitalization of specific areas. While private incubators are concentrated in industrialized areas and the university ones are positioned in university areas.

As for the market variable, it's clear that BICs operate at a regional level, while private incubators tend to operate nationally and internationally. Instead, UBIs operate both on a regional and national level.

In terms of the origin of incubated ideas, they can come from existing organization to which the incubator is related (internal) or from external organizations. University Incubators and Corporate Private Incubators, since they tend to exploit the knowledge of the organizations to which are affiliated

(academic or corporate spinoffs), have an internal origin of ideas and give priority to ideas coming from their parent organizations. BICs and IPIs, since they are not affiliated to specific organizations, are more external-oriented in the search of new business ideas to incubate.

The phase of intervention is different among the four categories but also depends on the single case analyzed. On a general extent, BICs and UPIs tend to intervene only in the early stages, so in the business concept definition and the early growth of the company. While the private ones – in addition to support startups in the first stages – help startups in accelerating them and with a day-by-day support until their independence and graduation from the incubation program.

The incubation period refers to the average time the incubator is willing to host the startup. Generally, public and university incubators tend to extend the time frame up to 2 years, which in business times is considered as long term. Although CPIs and IPIs support startups in the short-term, since they are often interested in speed up the process of promising business initiatives providing highly specialized services.

In terms of sources of revenues, public incubators are non-profit, so they cover their expenses through regional, national, or international funding and by offering services by which startups pay some fees. So, their earning model is based on funding and pay-per-use services, like rents. While, private incubators are profit-

oriented, so apart from the pay-per-use services, they also buy equity in the incubatees.

Talking about the services offered by incubators, as we already seen before, BICs are more oriented towards the provision of tangible services, while IPIs and CPIs are more oriented towards the intangible ones, like the transfer of competencies and the provision of knowledge-based services. UBIs commonly provide both tangible and intangible services.

Finally, the last variable is represented by the management teams. With this dimensions Grimaldi and Grandi (2005) intend to describe the degree of involvement in the startup support. Private incubators invest their own money in the new ventures and are day-by-day involved in their management decisions. Instead, public incubators act as intermediaries between the new ventures and external entities that provide the company with the competences it needs, since they do not have it in-house. The same pattern of behavior is reflected on UIPs, since they also act as intermediate.

The goal of my thesis, as stated previously, is to study what variables positively influence the success of incubators in the intrinsic support of startups.

From Grandi and Grimaldi's study, we see how each type of incubator provides a different type of support, and the distinction between each of them is relevant when considering some parameters as fundamental over others.

Within this framework, scholars consider private and university incubators to be similar in their provision of support to startups. The only major difference is the area of operation, which is university-related in the case of UBIs and technology-related in the case of IPIs and CPIs.

While, as far as BICs are concerned, they are portrayed as incubators that offer support at a superficial level and too general for the needs of startups, thus they are therefore considered inadequate to support new innovative business ideas.

But, considering that the study of the different typologies refers to incubators from 20 years ago, in my empirical model these differences will be studied in depth in chapter three, where an analysis is carried out to assess whether this difference between public and private incubators still exists.

In fact, my consideration starts from the fact that this study refers to a different era than the one we live in today and thanks to the latest industrial revolution, the existence of the Internet of Things and Industry 4.0, startups today need support more focused on the provision of intangible services and through an intrinsic connection on the territory. This supports the fact that we are faced with a revolution of the concept of innovation, which refers to the most disparate areas depending on the reference sector. From this reasoning it is clear that the difference in the success of incubators cannot be based on their origin, but that this is the result of other relevant factors.

For example, later it will be shown how the definition of an effective incubator should contain the discriminating factor of networking. Thus, to the extent that an incubator has good networking activities, it can be considered successful, without belonging to a specific typology of incubators. Indeed, as will be illustrated in the next section, of the top five reasons for startup failure, most are related to the lack of connection between the startup and the external environment in which it operates. These problems can only be solved by those incubators that are well connected to the external environment around them.

1.2 Definition of the business incubation process

Above all, the business incubation process is not precisely defined in many relevant studies. Ayatse et al (2017)[8], firstly state that the business incubation program is a tool of promoting innovation and economic development, that should be capable of adding value to incubated companies with the intent of increasing their survival rates. Through this concept, it can be asserted that the definition of the business incubation process is based on the value-adding activities provided by incubators to incubatees and is analytically described by the different models that will be briefly outlined. (Ayatse F.A., Kwahar N., Iyortsuun A.S., 2017)

1.2.1. Campbell, Kendrick, and Samuelson model

The first model has been designed by Campbell, Kendrick, and Samuelson (1985)[9] and is summarized in the Figure 1.2. It is based only on the functioning of private business incubators and describes four basic incubation services: diagnosis of needs and selection of companies; monitoring of incubator tenants; providing capital investments; and access to expert networks with the prospect of venture capital. After the provision of these services, if the incubation process has a

[8] Ayatse F.A., Kwahar N., Iyortsuun A.S. (2017) **Business incubation process and firm performance: an empirical review**. Journal of Global Entrepreneurship Research

[9] Campbell, C., Kendrick, R. C., & Samuelson, D. S. (1985). **Stalking the latent entrepreneur: business incubators and economic development**. Economic Development Review, 3(2), 43–49.

positive end, the incubator tenants graduate from the program as growth businesses. (Campbell C., 1985)

Figure 1.2. Campbell, Kendrick and Samuelson framework

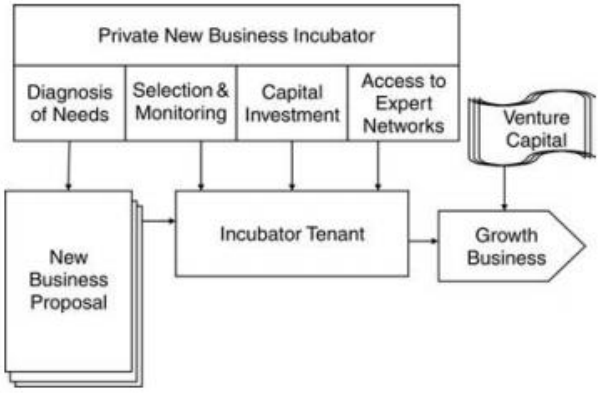


Figure 3. Campbell, Kendrick, and Samuelson framework (Campbell et al., 1985).

Source: Hackett S., Dilts D.M. (2004)

Right after the creation of this model, it was criticized for two reasons with which I agree. First, the Campbell model is developed with the assumption that all the incubated companies will survive in the market. Second, one of the biggest limits is that the model is only based on private incubators, thus not considering the importance of the public incubators and the universities' ones. And, even though it has been stated that public incubators are mechanisms that have an obsolete

functioning, they still have a relevant role in the innovation landscape. The same reasoning applies for university-related incubators, which role is fundamental in the support of new ventures. Hence, in 1987 another model has been designed.

1.2.2. Smilor model

Smilor (1987)[10] extended the Campbell model with the inclusion of private and public incubators, and the emphasis of the role of the external environment. Indeed, the description of the model (of which you can find a graphical representation in the figure 1.3) is based on the provision of two types of activities: the incubator affiliation and the support systems. Among the incubator affiliation activities, we find the presence of the private sector, universities, government, and non-profit agencies. While the support services are delivered in four ways: secretarial, administrative, business expertise and facilities.

All the activities are designed to achieve the objectives of economic development, technology diversification, job creation, profits, viable companies, and successful products. Smilor refers to these as the outcome of the process, hence the units with which the final result can be measured.

[10] Smilor, R. W. (1987)**. Managing the incubator system: critical success factors to accelerate new company development**. IEEE Transactions on Engineering Management, 146–156.

The key success practices are represented by the credibility development, the shortening of the learning curve, faster troubleshooting, and access to the network of entrepreneurs. (Smilor, 1987)

This model is in perfect line with my theoretical conception of the incubation process, plus the major contribution of the Smilor model on the current literature is that it was one of the pioneers in 80s who shifted the viewpoint from the provision of physical resources to the business expertise and services provision from incubators. But in the next section, another model which is more recent is described.

Figure 1.3: Smilor framework

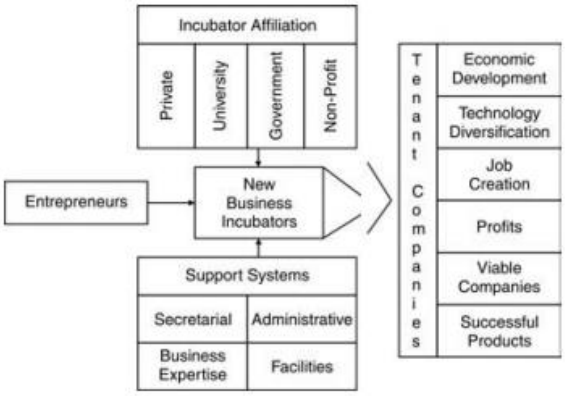


Figure 4. Smilor framework (Smilor, 1987).

Source: Hackett S., Dilts D.M. (2004)

1.2.3. Hackett and Dilts model

Nowadays, the model on which the business incubation process concept is established is the Hackett and Dilts[11] one, which is based on the Campbell et al. model. They describe the incubation mechanism as a "black-box" that has a starting point inside the incubator but builds a link with the external environment.

In order to describe the logic under the model, I built the Table 1.3 that you can find at the end of this paragraph.

The first two columns of the table refer to the antecedents from which the idea can be originated and the inputs of the incubation process. They are the pre-venture initiation activities, that may come from entrepreneurs; the community support for entrepreneurship which come from enabling technologies and innovation mechanisms (even the same incubator); the exogenous conduct of basic research that leads to the discovering of critical technologies; the events for entrepreneurial orientation from which strategic technologies can come up; and finally, the incubator feasibility studies.

Thus, the business incubation process itself is based on three main activities: selecting weak but promising firms for the incubation program, monitoring, and assisting the incubated companies, and providing the sources to guide them in the

[11] Hackett, S. M., Dilts, D. M. (2008). **Inside the Black Box of Business Incubation: Study B - Scale Assessment, Model Refinement, and Incubation Outcomes**. Journal of Technology Transfer.

graduation from the program as financially stable firms for assuring competitiveness in the market. Then, within the concept of incubation activities, of course we also have the development of new ventures and products from the inputs, arriving therefore to the output, represented by the incubated enterprise.

The selection of candidate companies is based on four types of characteristics: managerial, market, product, and finance. After being evaluated in the light of these characteristics, incubatees receive the next value-addition activity, that is monitoring and business assistance. This is defined as the degree to which the incubator observes and helps incubatees with the development of their ventures, including helping them to learn from low-cost failures and containing the cost of potential failure. This activity is carried out through time intensity, comprehensiveness and quality of the assistance provided. The last value-addition service described by the model is the resource munificence, defined as the relative abundance of incubator resources, measured by the resource availability, quality, and utilization.

After having defined the stages of the incubation process, the next step is the evaluation of the outcomes that Hackett and Dilts divided with respect to the timeframe in which they are measured.

Therefore, they defined the short-run outcome with five statements:

1. the incubatee is surviving and growing profitably,
2. the incubatee is surviving and growing and is on a path toward profitability,

3. the incubatee is surviving but is not growing and is not profitable or is only marginally profitable,

4. incubatee operations were terminated while still in the incubator but losses were minimized

5. incubatee operations were terminated while still in the incubator and the losses were large.

In terms of an intermediate time frame, they consider the first two sentences as positive outcomes of the incubation process, which means that the resulting company is viable or is becoming viable. While the last three outcomes are considered as negative results, even though they have a concept of positivity, which is the minimization of losses; but if the company is not profitable most likely it will die.

The long-term outcome, which is considered as the measure of efficiency and effectiveness, is represented by the growth and survival of the incubatee, viable companies, more jobs and profitable organizations. The control variables of this model are the population size, the state of economy and the incubator size.

The key contribution of their model stands in the fact that Hackett and Dilts argue that an incubator is the operationalization of a community strategy to promote the survival of new firms. Consequently, *"an incubator is an enabling technology, rather than a critical or a strategic technology"*. (Hackett S. M., Dilts D. M., 2008) They proved that the business incubation performance is positively linked

to the selection performance, to the intensity of monitoring and business assistance efforts, and to the resource munificence, creating the following formula:

$$BIP = f(SP + M\&BAI + RM)$$

Where BIP: Business Incubation Performance; SP: Selection Performance; M&BAI: Monitoring and Business Assistance Intensity; and RM: Resource Munificence.

The positive relation is explained by the fact that, with respect to the selection performance, they believe that the existence of a selection mechanism makes potential candidates more demanding with themselves, leading them to self-corrective measures. The business support and assistance is related with coaching and training activities for incubatees, and with mediation, which is how the incubator connects the incubatees with the external world. Finally, the graduation is related to what are the exit policies, that state under which circumstances incubatees should leave the incubators.

With their own words, the model is described as follows:

"*Briefly, the model indicates that incubatees are selected from a pool of incubation candidates, monitored and assisted, and infused with resources while they undergo early-stage development. Outcomes refer to the survival or failure of the incubatee at the time it exits the incubator. Controls include regional*

differences in economic dynamism, level of incubator development and size of incubator." (Hackett S. M., Dilts D. M., 2008)

One of the major critiques that comes out from this model is that the description of the incubation process is centered on the incubator perspective, risking losing focus on the element of importance for the incubatee to whom the incubators is supposed to provide services.

For the conduct of my thesis, the incubation model that will be considered is the Hackett and Dilts one. The reason for this choice is that it is the one that takes into consideration the contact with the outside world by the incubator and considers the incubation process as a system in which different stakeholders are involved, thus being the most complete model. Although, it too has critical issues and gaps that have not yet been resolved. In fact, apart from the criticism posed by various scholars, I have two main concerns.

The first criticism is related to the fact that there is no mention of what performance metrics are used to assess the survival of the business upon exiting the incubation program. This is the only way in which the success of the incubation process is defined so far. So, for completeness, a discussion of how venture performance is designed and what metrics might be used to assess the success of an incubated startup will follow in the next section.

The second and most important issue of concern is based on the fact that among the factors that influence business incubation performance, company selection

only considers the potential of the company through assessments based on team characteristics, financial and market potential, and their product. But, in this regard, they make absolutely no reference to concepts such as technological content, the innovativeness of the business idea and its potential, the coherence between the business area in which the startup operates and the services offered by the incubator. These factors for me are fundamental and, as will be demonstrated in the second chapter, today incubators also take these aspects into account in the selection process of companies to be incubated.

Table 1.3. The logic of Hackett and Dilts model

<table>
<tr><th>Antecedents</th><th>Inputs</th><th>Activities</th><th>Outputs</th><th>Initial outcomes</th><th>Intermediate outcomes</th><th>Long-term outcomes</th></tr>
<tr><td>Pre-venture initiation activities</td><td>Entrepreneurs</td><td rowspan="5">Incubation : new venture development + new product development + selection + monitoring & business assistance + resource munificence</td><td rowspan="5">Incubated companies</td><td>Incubatee is surviving & growing profitably</td><td rowspan="2">Viable/Becoming Viable company</td><td rowspan="5">Growth and survival of incubatees, job creation and profitable organizations</td></tr>
<tr><td>Community support for entrepreneurship</td><td>Enabling technologies / Innovations (including incubators)</td><td>Incubatee is surviving & growing and is on a path toward profitability</td></tr>
<tr><td>Exogenous conduct of basic research</td><td>Critical technologies / Innovations</td><td>Incubatee is surviving but not growing & not/only marginally profitable</td><td rowspan="3">Dead/Dying company</td></tr>
<tr><td>Events increasing individual entrepreneurial orientation</td><td>Strategic Technologies / Innovations</td><td>Incubatee operations terminated while still in the incubator but minimized losses</td></tr>
<tr><td>Incubator feasibility study</td><td></td><td>Incubatee operations terminated while still in the incubator & large losses</td></tr>
</table>

Source: author's elaboration

1.3 Definition of incubatees and firm performance

1.3.1. Definition of startups and spinoffs

The company undergoing the incubation process can be either a spinoff or a startup. The Colombian Institute for the Development of Science and Technology (2007)[12] presents the concept of business startup as a company originated from the identification of market opportunities by members of an organization and/or professional experts in a certain productive sector, who decide to create a business unit to take advantage of the business opportunity, by producing and marketing the product or service that properly satisfies the identified need. So, what characterizes a startup is the fact that it is a company born from the entrepreneurial idea of one or more people, which invests in research and has qualified personnel within it. (Zuluaga G., Eugenia M., Morales B., Carlos J. , 2007)

A spin-off is, on the other hand, a type of enterprise that aims to give form to an idea born in the context of another enterprise or university. In other words, it is a business created by splitting a company into two or more parts. Of fundamental importance is the fact that a spin-off maintains a solid link with the enterprise from which it was formed. Therefore, the basic principle of a spin-off is to create

[12] Zuluaga G., Eugenia M., Morales B., Carlos J. (2007) **Startup y spinoff: una comparación desde las etapas para la creación de proyectos empresariales**. Universidad Pontificia Bolivariana. Revista ciencias Estratégicas, vol. 24, núm. 36, julio, 2016, pp. 365-378

a new business entity, whose business plan includes the use of the know-how of the parent company.

The OECD[13] defines spinoffs as: (a) companies created by public sector researchers (staff personnel, faculty, or students); (b) start-ups that have licenses to exploit technologies created in the public sector; (c) start-ups sustained by a direct participation of public funds, or that were created from public research institutions.

What is missing in this definition is what is called the corporate spinoff, which the Corporate Finance Institute[14] describes as an operational strategy used by a company to create a new business subsidiary from its parent company. A spin-off occurs when a parent corporation separates part of its business operations into a second publicly traded entity and distributes shares of the new entity to its current shareholders. (2021)

The spinoff, having originated from an organization - whether that organization is a company or a university -, already has several facilities coming from the corporation from which it originates. The true functioning of the incubation program can be assessed through the consideration of the incubator's activity in

[13] OECD (2015). **Introduction: The New Spin on Spin-off**s. OECD Better policies for better lives.

[14] Corporate Finance Institute (2021). **Spin-Off. A parent company creates a new business, keeps ownership**. Available at: https://corporatefinanceinstitute.com/resources/knowledge/finance/spin-off-and-split-off/

providing support to startups, which are born from business ideas, but start without any previous support.

1.3.2. Definition of firm performance

In order to understand what the role of incubators is in supporting startups, it would be necessary to define what are the success factors of startups and what are the performance measures that allow to define a healthy and competitive firm in the market.

First, a broad definition of firm performance considers the effectiveness and efficiency as the two fundamental dimensions. Therefore, Neely et al.[15] define a performance measurement system as the process of quantifying the effectiveness and efficiency of an organization (Neely A., Gregory M. Platts K., 2005). But this is not enough to ensure that a business is healthy in the marketplace. In fact, this notion is mainly based on financial criteria with dimensions such as annual sales, annual profit, and number of clients (Khan M.N., Baharun R., Rahim K.A.,

[15] Neely, A., Gregory, M., & Platts, K. (2005). **Performance Measurement System Design: A Literature Review and Research Agenda**. International Journal of Operations and Production Management.

Zakuan N., 2011).[16] However, Malina & Selto (2004)[17] support a view in which performance measurements incorporate all the different stakeholders of an organization, thus introducing non-financial criteria in the process of assigning value. So, we can talk about a multidimensional view, in which financial criteria are considered as internally focused, historical in nature and directed through the short-term, thus being considered as part of a more complex system of values. (Malina M.A., Selto F.H., 2004)

Therefore, it can be stated that the relevant performance indices are identified as follows: revenues, sales growth, finance, venture capital funds, graduation from incubation program, firm survival, networking activity, innovativeness, firm growth, job creation, patents registered, alliances, technology transfer, number of patent applications, employment growth, research and development activity.

In further detail, focusing the attention on startups performance, Bednar and Tariskova (2017)[18] through the analysis of 51 startups that failed, identified the factors that led them to the failure (Figure 4).

As a result, the five most serious problems in startups are the following. Above all, the lack of money for further development plays an important role. They

[16] Khan, M. N., Baharun, R., Rahim, K. A., & Zakuan, N. (2011). **An empirical evidence of performance measurement of audit firms in Malaysia**. International Business Research, 4(4), 191–198

[17] Malina, M. A., & Selto, F. H. (2004). **Choice and change of measures in performance measurement models**. Management Accounting Research.

[18] Bednar R., Tariskova N. (2017). **Indicators of startup failure**. International Scientific Journal "Industry 4.0"

realized that most failed startups did not have the financial support in the phase when they did not generate revenue, which is at the beginning of their existence in the market. The lack of money led to next problems: reimbursement of capital expenditures, financing of expansion, covering operating costs for staff, offices, infrastructure, and other costs.

The second reason of startup failure is represented by the fact that the 28% of the sample did not find the interest in their products by the customers. Most of the founders defined this problem as a lack of real market testing, together with the wrong timing of product launch.

Always into the financial problems, the third reason of failure is the lack of interested investors. More in depth, the results are related to the failure in fulfilling the required goals of the investors, the lack of logic in the business model from the investor perspective, and the insufficient investor awareness of all issues in the startup.

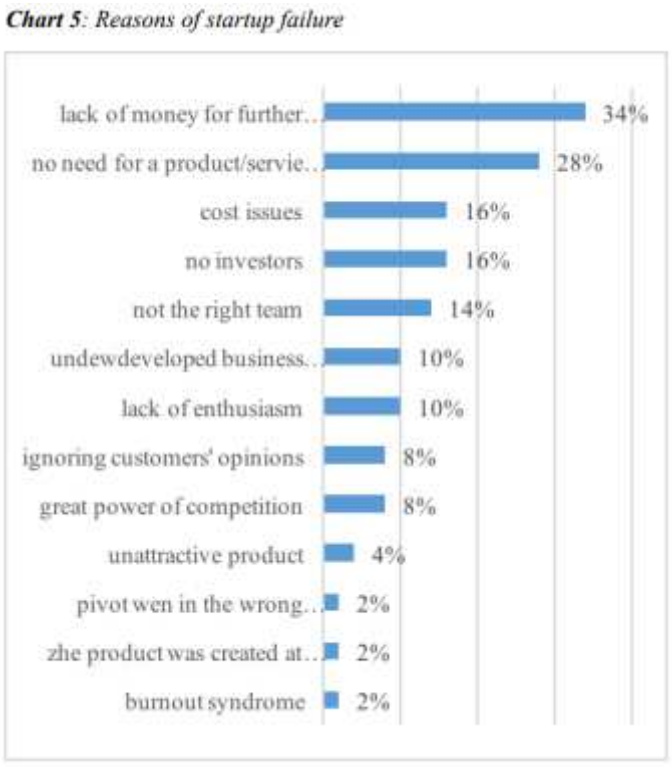
The fourth cause is related to cost issues and lack of accurate finance planning, that result in an incorrect price formation and so cost covering.

The last reason is the formation of a wrong team in the internal business environment of the startup. Stating that most investors evaluate the quality, the experience, the creativity, and the cooperation inside the team as key factors of success, they noticed that in most cases, startups need to change their business model several times, and this is possible only with a high-quality team. Anyway,

this is also related to a bad team leadership, which is then reflected in the team. (Bednar R., Tariskova N., 2017)

As a matter of fact, at least four of the five problems that are highlighted in this paper can be solved by the support of business incubators. So, here is again proved the relevance of these mechanisms.

Figure 1.4 Reasons of startup failure



Source: Bednar R., Tariskova N. (2017)

1.4 The notion of incubator success and effectiveness

In order to study how the business incubator affects business performance, we need to find a way to measure the success of incubators in supporting startups. Researchers have used various indicators to assess the effectiveness of the business incubation process, and there is no consensus on a set of variables that account for incubator success. Here in fact lies one of the most important gaps in the literature.

The first thing that comes out is that in the general business incubation literature the success is mainly assessed for public incubators. The reason stands in the fact that the topic has more relevance for them because public incubators should be accountable for the outcomes associated with the use of the public funds obtained.

The other concern is that the evaluation depends on the stakeholder expectations, that influence the indicators that used to measure the success and evaluate the effectiveness of business incubation, both because different stakeholders have different goals and because the type of data collected for one business incubator may not be the same for another.

In addition, it has been argued that the evaluation of business incubation success should contain a range of outcomes beyond purely statistical ones, as I already explained in the introduction. Since the incubators have the objective of providing

support to startups, the measures of success should also consider the soft aspects of business incubation and not only the financial aspects.

Therefore, the main challenge stands in evaluating the success of incubators through a homogeneous system of measurement units.

The Hackett and Dilts (2004)[19] study is included in this context. In fact, while trying to find a measure of success, through the systematic review of business incubation research, they have drawn the attention on the main question that comes out in this field, which is based on the performances of the incubated business. What was asked is "if the incubated company had not been incubated, would there be a difference in its performances?". However, this question cannot be easily answered, and here stands the real limitation of the previous studies. The main reason why there is this literature gap is that data on successful incubated companies are available since incubators tend to promote their successful stories for the purpose of obtaining funds. While data related to failed incubated companies are in a certain way hidden, since it may result in the reduction of the obtaining of operating subsidies by public incubators.

Whereas data on the success and failure of non-incubated firms is hard – if not impossible – to find because what should be taken as measurement index is often hidden by companies, clearly for reasons of competitiveness in the market.

[19] Hackett, S. M., & Dilts, D. M. (2004a). **A systematic review of business incubation research. Journal of Technology Transfer**.

In addition, always concerning the difficulties of collecting data in samples (between incubatee versus control groups), the lack of standardization in measures of success makes an effective evaluation difficult.

For these reasons, the only possible way to proceed by Hackett and Dilts was to collect the variables that can be measured for studying the incubation process among the ones that were presented by scholars prior to them. What is relevant for this thesis project is that they grouped the existing literature to find the critical success factors of incubators with respect to different agents: first, the general environment, that they identify as community and second, the individual incubate company. (Hackett S. M., Dilts D. M. , 2004a)

On a community level, they discovered that incubators provide a protected environment in which new ventures can develop, thus creating opportunities for the local economic expansion and investment. (Allen D.N., Rahman S. , 1985)[20] (Campbell, 1989)[21] With respect to this view, the source of value in the relationship with the community is based on the contribution to the cultural values of the community and the effectiveness of the communication with community leaders.

[20] Allen, D.N. and S. Rahman (1985) **Small Business Incubators: A Positive Environment for Entrepreneurship**. Journal of Small Business Management 23 (3), 12–22.

[21] Campbell, C. (1989) **Change Agents in the New Economy: Business Incubators and Economic Development.** Economic Development Review 7 (2), 56–59

Considering the relationship with the incubatees[22], charging them a below-to-market rent price for office space is at the basis of the general support given. Always as a basic service, incubators must provide valuable consulting services. Moreover, the intangibility under the network that comes out is relevant, since incubatees can assist and learn from one another. Finally, university technology incubators have positive environmental effects on incubatees, which is relevant for the innovativeness of the company. (Allen D.N., Rahman S. , 1985) (Temali M, 1984)

Hence to summarize and identify the list of variables that can be used for conducting the factor analysis, the measures of performance of incubators are what follows. With respect to the community, we can talk about community support, entrepreneurial network, entrepreneurial education, university ties. While, with respect to the incubatee, we can consider the access to institutional funding, financial support, selection, and monitoring for incubatees, and on-site business expertise.

[22] Temali, M. and C. Campbell (1984) **Business Incubator Profiles: A National Survey.** University of Minnesota, Hubert H. Humphrey Institute of Public Affairs

1.5 Conclusion

Summing up this literature review, first I have tried to give a complete definition of what business incubators are and which services they provide. In this field, a key study is the one by Grandi and Grimaldi (2005) that breaks down the types of incubators by giving a precise description. This study will be taken in consideration and the analysis will be deepened in chapter three to study if nowadays there is still a difference between public and private incubators in the variables listed.

Then, thanks to the review of Ayatse et al, I defined the entire incubation process and went deeper into the succession of different incubation models used over time, until I arrived at the incubation process designated by Hackett and Dilts, which, even if it contains some criticisms, I considered to be the most complete. In fact, this represents the basis on which the empirical model is built in chapter two. And, taking the incubation model designated by these scholars as a reference, a regression analysis will be conducted to study the validity of existing performance measures and the correlation of these with the success of the incubation process.

I then thought to give a more precise definition of what are the outcomes of the incubation process, thus defining startups and spinoffs and their performance measures, to give completeness to the theoretical model and to understand what

are the factors that mostly lead to the failure of startups. This was done to designate what are the key aspects to take care of in order for the startup to end the incubation process successfully.

Finally, in order to define the success of the incubation process, the study by Hackett and Dilts (2004a), thanks to the review of a number of previous studies, designated a series of measures performances that in chapter two are studied through a regression analysis. In any case, this study highlighted the biggest gap in the literature in this field to date, which is the inability to agree on a homogeneous method to define the success of incubators in supporting startups.

2. EMPIRICAL MODEL

This chapter designates the empirical model based on a regression analysis to study what key factors influence the success of incubators in supporting startups. In defining which control variables to test in the model, I based my hypotheses on the performance measures resulting from the literature review of Hackett and Dilts' (2004a) study.

In more detail, in the first section of the chapter, I discussed the reasons that led me to select certain data rather than others and listed the underlying assumptions to build the empirical model.

Then, there is a description of the methodology used and the individual analyses I conducted to arrive at meaningful results.

Finally, a discussion of the results obtained and the consequent empirical implications of the model follows in the last section of the chapter.

2.1 Data and assumptions

The model is constructed by taking data from a survey supplied by The Hive, a Business Incubator that operates in Ancona since 2014. This survey contains 96 questions submitted to 129 incubators coming from Italy and Romania. The questionnaire touches various topics, ranging from questions related to incubators' basic data (e.g., company purpose, legal nature, country of origin), to questions regarding the incubation process, the services offered, the criteria for selecting companies to be incubated, and the institutional objectives of the incubator.

Talking about the sample, it is composed of 74 Italian incubators and 54 Romanian ones and takes into consideration both public, private and those related to universities. Besides, the sample is composed by both for-profit and non-profit incubators.

As a first disclaimer, for the construction of the generic model, I did not implement any division between public and private incubators, although in the literature review it has been proven that there are various differences in business support based on the different types of services offered. In this sense, the hypothesis I support is that nowadays there is not a big difference in the support given to startups. And I intend to prove this by first building a model that takes both types of incubators into account, and then in the third chapter studying in depth the existence of the control variables in public and private incubators. The

same reasoning applies to the division between for-profit and non-profit incubators. Therefore, the model is based on both categories without distinction.

To construct the empirical model, I chose a few questions from the 96 asked, and the reasoning and assumptions implemented in choosing these will be described below.

To estimate a functional relationship between the output variable and the control variables, the study method I implemented is regression analysis, obtaining an equation that predicts the degree of correlation between the activities defined as critical to the success of the incubators, and the success itself.

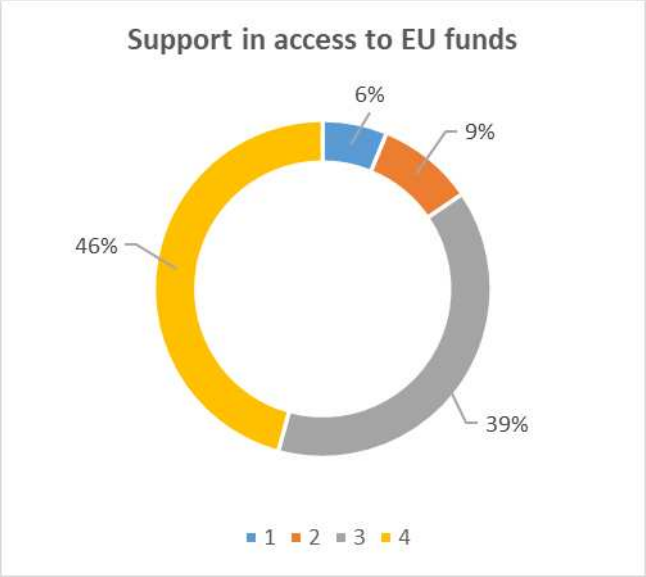
Starting with the description of the dependent variable, i.e., incubator success, this is represented by the following question: "Of the incubated firms, how many, as a percentage, ceased operations during or at the end of the incubation period (average of the last 5 years)?" The possible answers are as follows: less than 10%; 11% to 20%; 21% to 50%; more than 50%. To turn these answers into statistically usable data, I decided to scale them this way: "less than 10%" is a 4, "11% to 20%" is a 3, "21% to 50%" is a 2, and "more than 50%" is a 1.

Therefore, the scale goes from a 4, which is the best grade representing a successful incubator given the low number of businesses that fail during or in the following five years after the end of the incubation period; to a 1, assigned to unsuccessful incubators, given the relatively high number of failed businesses.

For determining the independent variables of the model, I linked the measures of performance discussed in the literature review with the questions available in the survey. As a disclaimer, I decided to not take in consideration the whole package of measures, but just the ones that are relevant for the aim of finding the factors that make a difference between various incubators. For this reason, the measures that were presented in the literature review as measures of performance but that are not tested in the model are the following ones: the on-site business expertise, the service of providing access to institutional fundings and the financial support given by incubators.

The basic reason under this decision is that the provision of business expertise services is at the basis of the support given to startups from incubators nowadays, thus not representing a discriminating factor of success of incubators. Same reasoning can be made for the service of providing access to institutional fundings and for the financial support to startups. Actually, as discussed in the literature review, the different models of incubation prove that the assistance in accessing capital is one of the basic activities of business incubators. For example, as you can appreciate from the Figure 2.1, the 85% of the sample provide the service of supporting new ventures in the access of European funds.

Figure 2.1. Support in access to European funds



Source: author's elaboration

Legend: the blue color (1) stands for the fact that the service is not offered, the orange color (2) represents the fact that the incubator is in the phase of organization for providing this service in the future, while the grey (3) and yellow (4) colors respectively represent the fact that the service is offered through external partners and by the internal staff.

Hence, in the following model the independent variables of the regression analysis address to the dimensions I retained fundamental for constituting a difference between the various incubators, that are: the community support, the

entrepreneurial network and the university ties, the entrepreneurial training, the selection criteria used and the monitoring activity during the incubation process.

First, to represent the community support, I chose a question referring to the main institutional objectives of the incubator. It asks if among the main institutional objectives, the incubator has the purpose of supporting open innovation and technological progress in the area in which the incubator operates. The question presents a scale of numbers ranging from 1 to 5 as possible answers. Incubators that give the least importance to the criterion vote 1, while those that assign the highest importance vote 5.

The second dimension I took in consideration is composed by merging two of the performance measurements together, the entrepreneurial network and the university ties, both representing the networking activities. These variables are described in the survey by a question concerning the existence of services of partnership and networking with universities, research centers or partners for innovation and development, but also with customers and suppliers. The possible answers range from whether this service is offered internally, to whether it is not available. In the range of responses there is also the possibility that the service is offered by partners outside the incubator or that it is in phase of organization but not yet offered. For the purposes of the analysis of data, I turned the answers using different scores. The first response – the service is offered by the internal staff – is a 4, if the service is offered by an external partner the assigned value is

3, while if it's in the phase of organization, it's a 2. Finally, if the service is not yet offered, the assigned score is 1.

The third dimension is entrepreneurial training, which is the core of startup team support. From the survey, I chose a question regarding the provision of tutoring and mentorship service. Like the previous question, even this one has four possible answers: service offered internally, service offered by external partners, service not available or being organized. And the data reading system is the same as the previous one, so 4 if the service is offered by the internal staff, 3 if it is offered by external partners, 2 if it is being organized, and 1 if it is not yet offered.

The fourth measure is the criteria used for selecting which startup is admitted to the incubation process, while the fifth and last one is the degree of monitoring startups during the incubation process. To test the selection criteria, I collected seven questions concerning the importance of the following aspects in the process of selection of incubatees: the potential of the business idea, the quality of the business plan, the characteristics of the entrepreneurial team, the progress of the project, the consistency between the mission of the incubator and the area of business in which the new venture operates, the level of the technological content and the importance of the fact that the new venture is a university spin-off. While, to measure the monitoring activity of the incubators, which is the last measure, I considered the question regarding the involvement of the incubator in the following phases: first the startup phase, that is, the implementation of the

business plan and the definition of the product/service characteristics; then the execution phase, that is, the development of the product and/or service, testing and implementation; finally, the business development support, that is, the research for commercial partners, sales channels, promotion and commercial communication. Both variables present scalable responses, from 1 (least importance of the criteria and minimum degree of involvement) to 5 (highest importance of the criteria and maximum degree of involvement).

2.1.1. Naming

In order to facilitate the reader's understanding of the material that will be presented in the following tables and graphs, here you can find a list of all the abbreviations used to describe each of the 13 independent variables and the dependent variable that are tested in the first regression model.

Beginning with the dependent variable, it was named "SUCC," referring to the following question: "Of the incubated companies, how many, in percentage, ceased operations during or at the end of the incubation period (average of the last 5 years)?"

Whereas, succeeding there are all the independent variables tested in the model and their abbreviations:

1. OP_INN: How much importance is given to the support of open innovation and technological innovation among the main institutional objectives of the incubator? (value/intensity)

2. NETW: Are the networking and partnership services offered?

3. TUT: Are the tutoring and mentoring services offered?

4. START: What is the extent of the incubator's involvement in the start-up phase (implementation of the business plan and definition of product/service features)?

5. IMPL: What is the extent of incubator's involvement in the implementation phase (development, testing and implementation of the product and/or service)?

6. BUS_DEV: What is the extent of incubator's involvement in the business development support phase (research of commercial partners, sales channels, promotion and commercial communication)?

7. BUS_ID: Among the criteria for selecting companies, what is the degree of importance of the potential of the business idea?

8. BUS_PL: Among the criteria for selecting companies, what is the degree of importance of the quality of the business plan?

9. TEAM: Among the criteria for selecting companies, what is the degree of importance of the characteristics of the entrepreneurial team?

10. BUS_PROJ: Among the criteria for selecting companies, what is the degree of importance of the business project progress status?

11. MISSION: Among the criteria for selecting companies, what is the degree of importance of the consistency between the mission of the incubator and the area of business of the incubatee?

12. TECH CONTENT: Among the criteria for selecting companies, what is the degree of importance of the proposed technological content?

13. SPIN-OFF_UN: Among the criteria for selecting companies, what is the degree of importance that the new venture is originated by processes of technological transfer from universities or other research centers?

2.2 Methodology and results

After describing the origin and transformation of the data that was used to build the model, the next step is to provide the detailed description of the methodology used.

As mentioned earlier, the first model consists of a multiple regression analysis, with 13 control variables and 1 dependent variable. The model relates all independent variables to the success variable, without implementing any discrimination or clustering.

The resulting output, described by Figure 2.2, is a significant model because the p-value of the F-statistic is less than 0.05 and the adjusted R-squared is 26%. The interesting result is that only 4 of the 13 variables have a p-value less than 0.05, thus being significantly relatable to the independent variable. However, this implies that although the overall model is relevant and significant, individually the other 10 variables cannot be significantly associated with the "success" variable. Further comments with respect to this result will be provided in the next section, where you can find all the empirical findings.

Figure 2.2. Multiple regression analysis – without clustering

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,578962042
R Square	0,335197046
Adjusted R Square	0,260045408
Standard Error	0,835952228
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	13	40,5198662	3,116912785	4,460275972	4,25705E-06
Residual	115	80,36385473	0,698816128		
Total	128	120,8837209			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95	Lower 95,0%	Upper 95,0%
Intercept	1,466355627	0,69463435	2,110974826	0,036940851	0,090418667	2,84229	0,090418667	2,842292587
OP_INN	0,165110149	0,099677266	1,65644742	0,100357301	-0,03233133	0,36255	-0,03233133	0,362551629
NETW	0,251786555	0,070240779	3,584620788	0,000496539	0,112653091	0,39092	0,112653091	0,390920019
TUT	-0,351308413	0,113803741	-3,086967162	0,002534345	-0,576731722	-0,12589	-0,576731722	-0,125885103
START	-0,001385548	0,077300062	-0,017924276	0,985730324	-0,154502093	0,15173	-0,154502093	0,151730997
IMPL	0,07186997	0,074916074	0,95933978	0,339400231	-0,076524354	0,22026	-0,076524354	0,220264294
BUS_DEV	0,01813091	0,073303863	0,247339084	0,805086855	-0,127069934	0,16333	-0,127069934	0,163331754
BUS_ID	0,130008097	0,091968652	1,413613168	0,160176769	-0,052164102	0,31218	-0,052164102	0,312180297
BUS_PL	-0,038038624	0,076110581	-0,499781021	0,618184198	-0,188799037	0,11272	-0,188799037	0,112721789
TEAM	0,040148378	0,089498394	0,448593277	0,6545692	-0,137130716	0,21743	-0,137130716	0,217427471
BUS_PROJ	0,087777209	0,072384829	1,212646501	0,227750239	-0,055603205	0,23116	-0,055603205	0,231157624
MISSION	0,183982459	0,062024507	2,966286538	0,003666663	0,061123849	0,30684	0,061123849	0,30684107
TECH CONTENT	-0,216688544	0,090745354	-2,387874806	0,01857545	-0,396437624	-0,03694	-0,396437624	-0,036939463
SPIN-OFF_UN	0,115635543	0,078766821	1,468074274	0,144813918	-0,040386369	0,27166	-0,040386369	0,271657455

Source: author's elaboration

To explore this issue further, I constructed several linear regression analyses, dividing and clustering the independent variables into groups according to the incubator performance measures resulting from the literature review.

Thus, starting from the community support (figure 2.3), the resulting model can be considered significant (with the p-value of the F-statistic less than 0.05) but the problem lies in the fact that the value of the coefficient of determination is too low. This means that the part of the variance of the success variable that is explained by the independent variable is too small. Thus, for these reasons, the overall model is not relevant which means that it is too weak to confirm a relevant connection between the support given by incubators to open innovation in the area in which they operate and their success in the incubation process.

Figure 2.3. Linear regression analysis – community support

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,202501169
R Square	0,041006724
Adjusted R Square	0,033455595
Standard Error	0,955410105
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	4,957045327	4,957045327	5,430542653	0,021364356
Residual	127	115,9266756	0,912808469		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	2,393297587	0,311826424	7,6750955	3,82832E-12	1,776249367	3,010345807	1,776249367	3,010345807
OP_INN	0,169034853	0,072536174	2,330352474	0,021364356	0,025498854	0,312570851	0,025498854	0,312570851

Source: author's elaboration

Continuing to test individual measures of incubator performance against the success variable, the regression analysis for networking activities (figure 2.4) is significant and the R-squared has a higher value than the previous one, even if it's still considered a low value. This confirm a stronger relationship between the networking activities and the success of incubators rather than the support of open innovation, but it seems logic that, alone, it is not enough. This means that the networking service is something necessary in the process of incubation, but not sufficient alone to ensure that the startup leaves the process in a successful manner, which is a pretty acceptable output.

Figure 2.4. Linear regression analysis – Networking activities

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,361848748
R Square	0,130934516
Adjusted R Square	0,124091481
Standard Error	0,909511721
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	15,82785153	15,82785153	19,13398228	2,51446E-05
Residual	127	105,0558694	0,82721157		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	2,203539088	0,218545351	10,08275435	6,36526E-18	1,771077278	2,636000897	1,771077278	2,636000897
NETW	0,29122705	0,066577737	4,374240767	2,51446E-05	0,159481724	0,422972376	0,159481724	0,422972376

Source: author's elaboration

The next regression analysis concerns the relationship between success and the provision of tutoring and mentorship services (figure 2.5). In this case, the p-value of the control variable is less than 0.05, but the R-square is too low to consider the relationship as relevant.

Figure 2.5. Linear regression analysis – Tutoring activities

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,177597815
R Square	0,031540984
Adjusted R Square	0,023915322
Standard Error	0,960113713
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3,81279151	3,81279151	4,136163642	0,044059311
Residual	127	117,0709294	0,921818342		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	3,989168414	0,448670863	8,891079736	5,08236E-15	3,101329746	4,877007081	3,101329746	4,877007081
TUTOR	-0,239343117	0,117685264	-2,033756043	0,044059311	-0,472221016	-0,00646522	-0,472221016	-0,006465217

Source: author's elaboration

Another variable of particular interest is the adoption of different criteria for the selection of which firm can be incubated. To test this variable, I related the success variable with the following criteria: the potential of the business idea, the quality of the business plan, the characteristics of the entrepreneurial team, the stage of progress of the business project, the coherence of the startup's business

area with the mission of the incubator, the level of the proposed technological content and the origin of technology transfer processes from the university or other research centers.

Figure 2.6. Multiple regression analysis – selection criteria

SUMMARY OUTPUT

Regression Statistics	
Multiple F	0,404606672
R Square	0,163706559
Adjusted I	0,115325947
Standard	0,914051298
Observati	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regressio	7	19,78945802	2,82706543	3,383722353	0,00247133
Residual	121	101,0942629	0,83548978		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	1,693920467	0,688247532	2,4612082	0,015257209	0,331352943	3,05648799	0,331352943	3,05648799
BUS_ID	0,108704706	0,096081791	1,13137676	0,260133878	-0,08151454	0,29892395	-0,08151454	0,298923954
BUS_PL	-0,054175691	0,07905928	-0,68525404	0,494494313	-0,21069439	0,10234301	-0,21069439	0,102343006
TEAM	0,042894305	0,089200802	0,48087353	0,631474757	-0,13370221	0,21949082	-0,13370221	0,21949082
PROJ	0,006704616	0,072919526	0,09194541	0,926893461	-0,13765882	0,15106805	-0,13765882	0,151068052
MISSION	0,281304999	0,063254452	4,4471968	1,94371E-05	0,156076126	0,40653387	0,156076126	0,406533872
TECH CON	-0,1039572	0,087268941	-1,19122793	0,235895564	-0,27672909	0,06881469	-0,27672909	0,068814687
SPIN-OFF_	0,062721902	0,078204287	0,80202639	0,424110035	-0,09210411	0,21754792	-0,09210411	0,217547916

Source: author's elaboration

From the regression analysis (figure 2.6), we can notice that the only variable considered significantly relatable to the independent variable is the relevance of the business area of the startup to the mission of the incubator. For this reason, I built a linear regression model (figure 2.7) to correlate only that variable to the success of the incubators, thus finding the following regression equation:

$$succ = 2{,}010 + 0{,}258\, mission$$

As for the provision of networking services, the model is significant but the R-square has a low value, thus confirming that the relationship between chosing a startup that has a coherent mission with the incubator is a good thing for the incubation process, but it is not sufficient alone for ensuring the success. Considered in a broader framework, however, it remains a factor that adds value to the incubation process.

Figure 7. Linear regression analysis – selection criteria: coherence of missions

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,375194641
R Square	0,140771018
Adjusted R Square	0,134005436
Standard Error	0,904349927
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	17,01692451	17,01692451	20,80693241	1,18105E-05
Residual	127	103,8667964	0,817848791		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	2,099568153	0,231891719	9,054088523	2,0543E-15	1,640696289	2,558440017	1,640696289	2,558440017
MISSION	0,258378444	0,056643783	4,561461652	1,18105E-05	0,14629062	0,370466269	0,14629062	0,370466269

Source: author's elaboration

In order to test the last dimension, which is the evaluation of the degree of involvement of incubators in the intrinsic support of startups, I took the three

questions regarding the topic and I put them together. The reasoning under this decision is that the involvement of business incubators during the period of permanence of the incubatee starts with the first phase of the business plan implementation and the creation of the startup; ending with the implementation of the product and services and the business development support, that is the research of commercial partners, sales channels, promotion and commercial communication. I chose to not consider the activities of financial support and assistance in the obtainment of institutional funding, precisely because they stand at the foundation of incubators' involvement in supporting startups. As explained earlier, they are not variables according which we can base a difference between incubators.

So, having said that, I computed the average between the answers' scores for these three variables: START, IMPL and BUS_DEV, creating the variable called INVOLV (Table 2.1).

Table 2.1. The involvement of business incubators – scores and average

n. incub	START	IMPL	BUS_DEV	INVOLV
1	3	3	3	3,00
2	4	4	5	4,33
3	4	4	2	3,33
4	3	3	5	3,67
5	5	5	3	4,33
6	5	2	2	3,00
7	5	3	3	3,67
8	2	2	2	2,00
9	5	5	2	4,00
10	5	3	3	3,67
11	5	3	3	3,67
12	5	5	2	4,00
13	5	5	2	4,00
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
121	2	4	4	3,33
122	2	1	1	1,33
123	5	3	4	4,00
124	2	2	3	2,33
125	3	2	4	3,00
126	3	3	2	2,67
127	2	3	2	2,33
128	4	3	4	3,67
129	3	2	2	2,33

Source: author's elaboration

Linking the degree of involvement to the success variable I built a significant linear regression model (Figure 2.8) with the p-value less than 0.05. But, as for some of the previous models, looking at the coefficient of determination (R-squared), that is the portion of the variance for the success variable that is explained by the independent variable (involvement), we can see that the value is

too low (almost 6%), so the percentage by which the variability of the model errors are reduced relative to the variance of the involvement variable is too low to accept this model.

Figure 2.8. Linear regression analysis - involvement

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,254261152
R Square	0,064648733
Adjusted R Square	0,057283763
Standard Error	0,943559776
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7,814979448	7,814979448	8,777867135	0,003641126
Residual	127	113,0687415	0,890305051		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	2,13554971	0,333678043	6,400030663	2,73288E-09	1,475261079	2,795838341	1,475261079	2,795838341
INVOLV	0,268120306	0,090497213	2,962746553	0,003641126	0,089042653	0,447197958	0,089042653	0,447197958

Source: author's elaboration

At this point of the analysis, I decided to study only those variables which - considering all the analysis carried out up to this point - are significantly relatable to the success variable from the individual linear regression models, with the aim of obtaining a regression equation with significant coefficients.

Therefore, I obtained the following regression equation:

$$succ = 2.3 + 0.21\,netw - 0.29\,tutor + 0.15\,involv + 0.18\,mission$$

Where, *succ* is the success of incubators, *netw* is the networking and partnership services, *tut* is the tutoring and mentoring services, *involv* represents the degree of involvement in the incubation process, and *mission* represent the importance of the coherence between the mission of the incubator and the incubatee's area of business in the selection process.

In the Figure 2.9 you can find the full regression analysis. As a result, the overall model is significant (Fisher's test p-value is less than 0.05). The adjusted R-squared is 24.3% that commonly by researchers is considered a low value. But one has to keep in mind that the model is based on mostly qualitative data that have been transformed into quantitative data and that are based on a questionnaire whose answers depend on the incubators themselves self-assessing their performance in the different fields. Thus, in my opinion, an adjusted R-square level above 20% can be considered acceptable for the relevance of the model.

Regarding the analysis of individual variables, the p-value in all individual variables is less than 0.05. Thus, they are all significantly relatable to the dependent variable "success".

Figure 2.9. Multiple regression analysis with significant variables

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,516714974
R Square	0,266994365
Adjusted R Square	0,243349021
Standard Error	0,84533086
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	32,27527225	8,068818063	11,29162574	7,60363E-08
Residual	124	88,60844868	0,714584264		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	2,302333897	0,486747501	4,730037426	6,00286E-06	1,338924246	3,265743547	1,338924246	3,265743547
NETW	0,210582345	0,066210509	3,180497295	0,001857542	0,079533201	0,34163149	0,079533201	0,34163149
TUTOR	-0,287870544	0,105146736	-2,737798188	0,007095687	-0,495985389	-0,0797557	-0,495985389	-0,0797557
INVOLV	0,148170573	0,087735031	1,688841638	0,093762951	-0,025481629	0,321822775	-0,025481629	0,321822775
MISSION	0,181076033	0,056430472	3,208834269	0,001696601	0,069384321	0,292767744	0,069384321	0,292767744

Source: author's elaboration

The first thing that jumps out when looking at the regression equation is the negative coefficient of the TUTOR variable. This suggests that there is a negative relationship between the provision of tutorship and mentorship services and the success of incubators in supporting startups. So, delving deeper into the statistical analysis, I decided to analyze the frequency distribution of the variable for determining how many incubators are offering this service. From the table 2.2, 85.3% of the incubators in the sample analyzed offer this service through internal staff, 9.3% of incubators offer the service through external partners and 5.4% of incubators do not offer the service. Thus, almost 95% of incubators provide

services of tutoring and mentorship. From this I concluded that it is a basic service in startup support; therefore, I believe it is appropriate to set it aside in the model study, as the goal is to find a relationship between the factors that make a difference among incubators in supporting startups.

Table 2.2. Frequency of distribution of tutoring and mentoring service

	TUTOR	FREQ	REL FREQ
	1	7	0,054
	2	0	0
	3	12	0,093
	4	110	0,853
TOT		**129**	**1**

Source: author's elaboration

Legend: 1: the service is not offered, 2: the incubator is organizing to offer it in the future, 3: the service is offered by external partners, 4: the service is offered by the internal staff

Another reasoning can be made for the degree of involvement of the incubator in the different stages of the incubation process. It seems logical that if the incubator is more involved, it lends more support, and the resulting company is more successful.

The purpose of the analysis, however, lies in finding the key factors that actively influence incubators' success in supporting startups, not in assessing the amount of time and resources that are spent in the incubation process.

Therefore, supporting my reasoning in part due to the fact that from the linear regression model that relates the degree of incubator involvement to success, the result is given by a significant relationship within an irrelevant model, I hypothesized that greater involvement necessarily leads to greater success, but that this is not a discriminating factor between different incubators.

Thus, by removing the TUTOR and INVOLV variables, I found the final and definitive model with the following regression equation:

$$succ = 1.62 + 0.23\, netw + 0.21\, mission$$

Where, “succ” is referring to the success variable, “netw” is the networking variable and “mission” refers to the importance of the coherence between the mission of the incubator and the incubatee’s area of business in the selection process.

In the Figure 2.10, you can find the complete output of the regression analysis. The value of the adjusted R-squared is at 20%. The p-value of the F-test is lower than 0.05, so the overall model is significant, and even the p-value of the single

variables is lower than 0.05, thus making the control variables relatable to the output variable.

Figure 2.10. Multiple regression analysis – final model

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,461599127
R Square	0,213073754
Adjusted R Square	0,200582861
Standard Error	0,868891708
Observations	129

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	25,75714818	12,87857409	17,05832859	2,77871E-07
Residual	126	95,12657275	0,7549728		
Total	128	120,8837209			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	1,616019862	0,264266402	6,11511661	1,12123E-08	1,093044422	2,138995302	1,093044422	2,138995302
NETW	0,225123675	0,066164578	3,402480313	0,000895537	0,09418592	0,35606143	0,09418592	0,35606143
MISSION	0,205311915	0,056613573	3,62654934	0,000415616	0,093275319	0,317348512	0,093275319	0,317348512

Source: author's elaboration

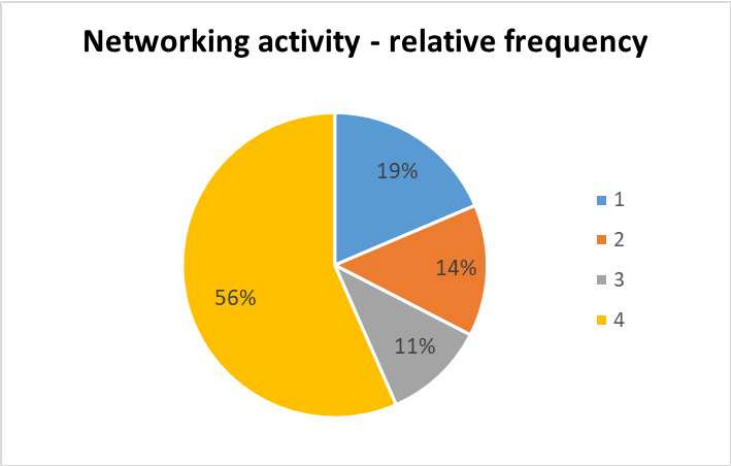
2.3 Empirical findings

2.3.1. Main outcomes

The final model constructed after the described attempts to empirically correlate the performance dimensions of incubators to their success in supporting startups includes two control variables: the networking activity and the consistency between the mission of the incubator and the business area of the incubatee in the selection process.

Analyzing in depth the first variable, the frequency distribution (figure 2.11) shows that 57% of the incubators in the sample carry out networking activities through internal staff, while 11% entrust the service to external partners. On the other hand, 33% of the sample does not offer the service or is in the process of organizing for a future one.

Figure 2.11. Relative frequency of the networking activity



Source: author's elaboration

Legend: the blue color (1) stands for the fact that the service is not offered, the orange color (2) represents the fact that the incubator is in the phase of organization for providing this service in the future, while the grey (3) and yellow (4) colors respectively represent the fact that the service is offered through external partners and by the internal staff.

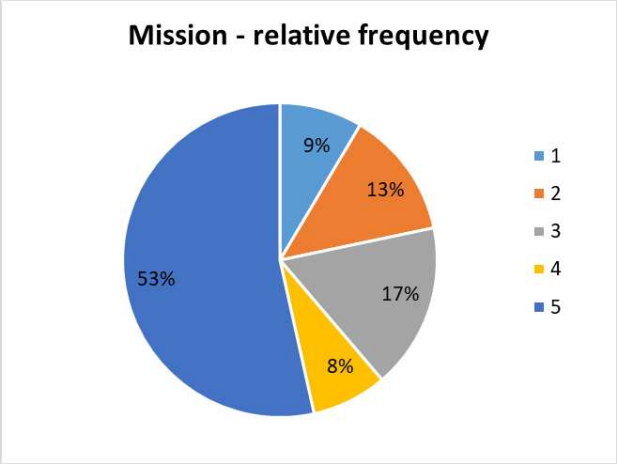
The positive correlation between the provision of networking services and the success of incubators confirms what was discussed in the literature review. Thus, nowadays, connections with the external environment are crucial for supporting the development of new ideas and small businesses that, as per definition, do not

have all the necessary skills and expertise in the market. Merging the interests of different businesses with different assets to arrive at a common outcome is a key to success in the market. Consequently, today incubators are considered intermediary mechanisms between the incubatee and a series of stakeholders, such as customers, suppliers, investors, research partners and universities, but also companies considered competitors that could be allied in strategic contexts.

With regard to the second variable, in the selection of companies to be incubated, the consistency between the mission and institutional goals of the incubator and the business area in which the startup operates has a significant importance in determining the success of the incubation process.

Analyzing the frequency distribution of incubators that consider this criterion fundamental in selecting incubates (figure 2.12), we can see that 61% of the sample assigned a rating between 4 and 5. Further relevant information is given by the fact that, on average, the criterion is rated 3.8. This means that, on average, incubators consider the selection of startups based on the business area in which they operate important but not necessarily discriminating.

Figure 2.12. Relative frequency of the selection criterion of missions' consistency



Source: author's elaboration

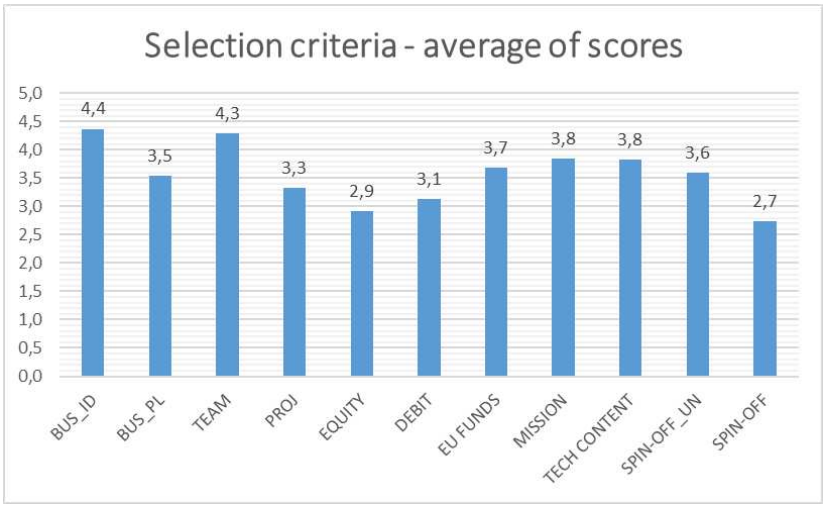
Legend: the scores go from 1 to 5 depending on the importance of the selection criteria. The more important the criterion has been declared, the higher the score.

By comparing (Figure 2.13) the average of the evaluations given to the different selection criteria by the incubators in the sample, it can be seen that the most important criteria are the potential of the business idea (BUS_ID: 4.4) and the characteristics of the entrepreneurial team (TEAM: 4.3). Then, following that, the

criteria that are taken into consideration are the consistency between the missions and the level of technological content of the business proposal presented.

From this I could infer that, incubators tend to choose new ventures that already start with a winning idea and a strong team and are therefore promising start-ups with great potential. Consequently, the company that results from the incubation will necessarily be successful, regardless of the incubation process. But what one should understand is that in order for the incubation process to be successful, incubators should select companies based on what they can offer them and consequently on the consistency of the mission and values pursued by the incubatee and the incubator. That is to say that if you choose a new venture that needs something different than what you offer and that has different values, it's normal that you will not succeed in the incubation process, because there is no connection between what is offered and what is asked.

Figure 2.13. Selection criteria – average of scores



Source: author's elaboration

On the other hand, it is clear that using only one criterion to select companies is not advisable and taking into consideration also the characteristics of the entrepreneurial team, the quality of the business plan and the potential of the business idea is not wrong. In fact, the point is that they should not be relied on solely and exclusively.

Anyway, the purpose of my analysis is to study the incubation process to find the key factors for success in supporting startups, and the results of the regression analysis are in line with what I expected. In fact, as previously illustrated, there was no correlation between the selection criteria that take into account the

potential of the startup, but the only significant correlation concerns the consistency of the mission.

2.3.2. Further observations

Setting the final model aside, some interesting results emerged from the various regression analyses.

First, it can be seen that when attempting to find an equation that relates all of the performance measures resulting from the literature review to incubator success, only four of them were found to be significant: open innovation support, networking activities, mentoring activities, and the entrepreneurial project status selection criterion. Moving from this preliminary and raw analysis to the final model, the only variable that remained significant and relevant as an impact in success were networking activities.

This is in confirmation of what had been discussed in the literature review. That is, that in 2021 startups have problems that are mostly solved through external contact and relationships.

For example, among the reasons why startups fail, the biggest problems include lack of money for further development and finding new investors who believe in

the business project. In this sense, a good incubator with a good network of contacts can be crucial to the survival of new ventures.

Among the reasons for failure there also are the lack of market studies, and the fact that the team is not motivated or skilled enough to cope with the innovation needs of new ventures. In this sense, the incubator can be supportive in connecting the business with the external environment in a more grounded way. If a worker or partner on the entrepreneurial team is not adequate to fill the role, he or she can be replaced by the right person in the marketplace more immediately if the enterprise has a network of contacts that allows it to explore the competence and suitability of the workforce outside its core workforce.

The same reasoning can be made for solving market study problems. Often, an intuition and a business idea are not enough to ensure success in the marketplace; what is needed is a thorough study of consumer tastes, market prices, and the moves of existing competitors and potential entrants. But information in the market is increasingly tight, due to the growth of competition. In addition, entrepreneurs often do not know where to get the information or where to start analyzing it. The support of business incubators here becomes crucial, both in terms of offering management expertise and business plan analysis, but especially in terms of information availability. The more the incubator is well-connected in the national and international territory in which it operates, the more the new

company will gain insights into market behavior and existing alternatives to its product or service.

Another interesting result was found in testing the relationship between the community support from the incubator and the success of the incubation process. Although the linear regression model was not found to be significant, the support for open innovation as a control variable was significant in a broader context, while linking it with other 12 variables in the first attempt at regression model construction.

This, in my opinion, reflects a correlation with networking activities. The reason stands in the fact that in 2021, open innovation is one of the most popular ways for companies to innovate. It's about being open to new ideas from the outside environment, without limiting the use of those ideas based on where they come from. Gassmann et al. (2010) [23] define open innovation as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively". (Gassman O., Enkel E., Chesbrough H., 2010)

Conceptualizing open innovation in this context, the link that supporting it has with networking activities seems clear. The more open you are to welcoming new ideas from outside, the more you build networks around you. In fact, one of the

[23] Gassmann, O., Enkel, E., & Chesbrough, H. (2010). **The future of open innovation**. R&D Management.

tools for implementing open innovation strategies is the use of Corporate Incubation programs, that are a step beyond scouting activities, calls for ideas and startup competitions. They are programs set up by specific business units responsible for identifying and supporting new business opportunities for possible acquisitions or synergies and for developing an entrepreneurial culture within the companies themselves. These programs are often based on the activity of scouting and development of ideas from outside or inside the company inherent to the main sector of the company developing the program. (Shankar R.K., Shepherd D.A., 2019)[24]

An unexpected finding, however, is the negative correlation between providing mentoring and tutoring services to startups and the success of the incubation process. I first assumed that the more the entrepreneurial team is encouraged, and the skills and competencies of employers and employees are trained, the more successful the startup will be at the end of the incubation period. Whereas, in reality the negative relationship suggests that the more the incubator provides mentoring services to the startup, the less successful the incubation process is.

As already shown by the frequency distribution of this variable in the sample analyzed, this service appears to be offered by 95% of the sample, thus being considered a common service.

[24] Shankar R.K., Shepherd D.A., (2019). **Accelerating strategic fit or venture emergence: Different paths adopted by corporate accelerators**. Journal of Business Venturing

2.4 Limits of the model

The first limitation of the model is given by the fact that it was built basing the analysis on purely qualitative data that were then transformed into quantitative data thanks to a system of scores that allowed to build an evaluation scale. In all of this, the problem lies in the fact that using qualitative data does not provide an accurate measure of the studied phenomena. It would have been interesting to study the incubation process by having concrete data available. For example, having the number of companies that each incubator admits to the incubation process compared to the total number of requests, with the consequent successes after the incubation period, would allow an in-depth investigation of the effectiveness of the selection criteria chosen by the incubator.

As another example, in order to study whether incubators can compensate for the problems that lead to the failure of startups, we would need to have data regarding the exact number of companies that failed after the incubation process. But unfortunately, this information is not available. The information available in the survey is generic and the biographical data concerns only the institutional mission of the incubator, the origin of the incubator and where it comes from. There is nothing that leads to the number of businesses incubated or the number of successes achieved by individual business incubators in the sample.

Another limitation of the model is that it is based on data collected through a self-assessment of the same parties that are being studied. Because of this, it is natural that there is a bias that leads to the distortion of the accuracy of data. It is psychologically proven that in the process of self-assessment the answers to questions are distorted, and this affects the study as a whole. If you had truly objective answers, the results might have been different.

Another limitation of the model is that it is based on 129 incubators that may not truthfully represent the innovation landscape in Italy and Romania. For example, nowadays in Italy there are 212 incubators and accelerators and the sample analyzed refers to 74 Italian incubators, which therefore represent only the 35% of the total number of subjects that could have been included in the study. With this I do not discredit my model that has a high enough number of subjects to be studied using a regression analysis, but with a larger sample a higher accuracy would have been obtained.

A final limitation of the model is the fact that, as discussed in the literature review, probably different types of incubators offer different services to startups, and therefore it would be interesting to test this hypothesis and understand if having considered them all together, the result of the regression model might have been subject to bias. In this regard, it is interesting to analyze the different variables by dividing the sample between public and private incubators.

To address the last two limitation of the constructed regression model, in the next chapter you will find a comparison between the behavior pattern of private and public incubators will follow.

3. PRIVATE AND PUBLIC INCUBATORS: ARE THEY STILL SO DIFFERENT?

In the literature review, one of the main differences in the study of incubators is based on the division between public and private incubators. But, as pointed out in the first chapter, the difference is noted by a study conducted in 2005. For this reason, I would like to explore this issue further and analyze the difference nowadays, almost 20 years later.

Therefore, this chapter contains first an in-depth analysis of the differences between public and private incubators based on the two variables that determine success in the empirical model just discussed: networking activities and mission consistency between incubator and incubatee as selection criteria. Secondly, I decided to test the existence of the differences between incubator types by studying the existence of the incubators characterizing variables mentioned in the study of Grandi and Grimaldi, using the empirical data collected in the survey.

3.1 Are there differences based on the empirical model?

In order to analyze the pattern of behavior of different incubators according to their nature, I undertook a new regression analysis dividing the sample into two parts: private and mixed incubators (the category by which we refer to university incubators) are part of the first group, while public incubators make up the second group. As a disclaimer, mixed incubators were assigned to the first group for the reasons already discussed in the literature review. Through various studies, it was understood that they have more elements of similarity to private incubators than to public incubators.

In the analysis of the output of the regression, one must keep in mind that the sample of private incubators analyzed is composed of 90 incubators and no longer of 129 as the previous one. While the public incubators analyzed form a sample of 39 observations.

From the figures 3.1 and 3.2 you can appreciate that both models are significant overall, and the individual independent variables are significant having a p-value lower than 0.05. The difference lies in the fact that in the study of private incubators, the adjusted R-square is 10%, while for public incubators it is about 48%. It is important to remember that, in general, in behavioral sciences it is normal to find an R-square of less than 50%. But the R-square at 10% is a decidedly low value to confirm the ability of the two control variables to predict

the dependent variable. This means that when considering the model with private and mixed incubators, the observed variable depends on several different factors, many of which were not measured.

This, however, is not true for public incubators, considering that in this case the model has a much higher ability to predict the success of the incubation process through networking activities and the selection criterion that considers missions consistency.

The difference between the two models could be based on the fact that, as the study by Grimaldi and Grandi shows, public incubators refer to generic industrial sectors and the location in which they operate are areas in need of revitalization. Consequently, the model's ability to predict success using two variables that are generic in nature is greater. In fact, in the choice of which firm to incubate, the coherence between the mission of the incubator and the business area in which the startup operates comes to be fundamental for public incubators. As discussed in the previous chapter, the mission of the incubator is understood as the set of goals it aims to achieve in the long term. Consequently, the choice of startups that need the services and support offered by the incubator is crucial to the success of the entire incubation process. If start-ups with high potential are admitted but do not make a connection with the objectives that the incubator claims to achieve in the long term, the incubation process is useless and consequently unsuccessful.

Whereas, private incubators, according to Grandi and Grimaldi's study, operate in specific sectors according to their mission, covering a market with dimensions ranging from the regions in which they operate to an international reach.

One can infer that the reason the model turns out to be irrelevant to private incubators could be traced to the fact that private incubators have a specific reach. They each cover a different area, offer different services, and provide support to different types of startups. While the constructed model contains generic control variables.

As a result, the choice of startups consistent with their mission has already been partially obviated by the fact that all startups in that sector operate in business areas that are in line with those private incubators in the sector. The same reasoning is applied to university incubators. In fact, from the review of Grandi and Grimaldi's study, it can be concluded that university incubators operate in the university sector and deal with areas close to university. Consequently, it is clear that startups requesting to be incubated in their processes operate in business areas that are directly related to their mission.

Figure 3.1. Multiple regression analysis – private and mixed incubators

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,350228814
R Square	0,122660222
Adjusted R Square	0,102491491
Standard Error	0,91432701
Observations	90

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	10,16853239	5,084266195	6,081702646	0,003371322
Residual	87	72,73146761	0,835993881		
Total	89	82,9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	1,904622111	0,337993419	5,63508637	2,1219E-07	1,232823591	2,576420631	1,232823591	2,576420631
NETW	0,162929633	0,080192334	2,031735775	0,045231441	0,003538687	0,32232058	0,003538687	0,32232058
MISSION	0,163614557	0,071061296	2,302442643	0,023697167	0,022372538	0,304856577	0,022372538	0,304856577

Source: author's elaboration

Figure 3.2. Multiple regression analysis – public incubators

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,713651182
R Square	0,50929801
Adjusted R Square	0,482036788
Standard Error	0,709425185
Observations	39

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	18,80484959	9,402424794	18,68214182	2,72095E-06
Residual	36	18,11822734	0,503284093		
Total	38	36,92307692			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,995606473	0,384967479	2,586209297	0,013895527	0,214856238	1,776356707	0,214856238	1,776356707
NETW	0,355229127	0,113136572	3,139825792	0,003369443	0,125777524	0,584680729	0,125777524	0,584680729
MISSION	0,299074872	0,088704608	3,371582135	0,001797166	0,119173589	0,478976156	0,119173589	0,478976156

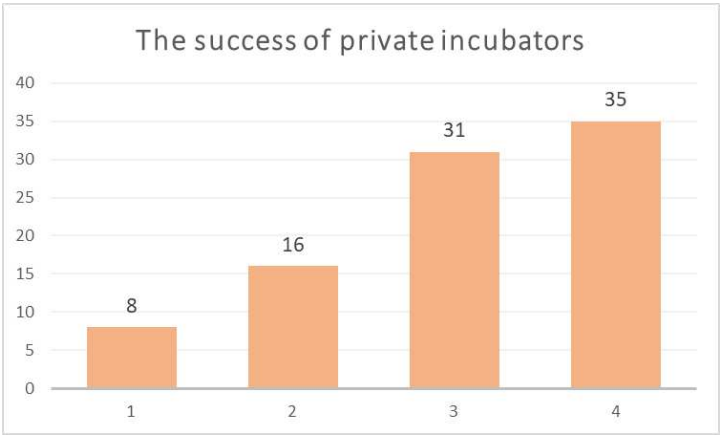
Source: author's elaboration

3.2 Descriptive statistics on the variables of the model

Actually, from the literature review it can be inferred that there is no absolute best way to incubate new ventures. Incubators, regardless of whether they are public or private, can be more or less successful due to several factors. Therefore, after concluding that the regression model is highly significant for public incubators, while it is less significant for private and university incubators, we can study whether there is still a difference between public and private incubators in 2021 based on the frequency distribution of the variables studied in the regression analysis.

To begin with, I studied the frequency distribution of the variable success in the two groups, which is made explicit by the following question: Of the incubated companies, how many, in %, ceased operations during or at the end of the incubation period (average of the last 5 years)? The possible answers are as follows: more than 50%, between 21% and 50%, between 11% and 20%, and less than 10%.

Figure 3.3. Frequency distribution of the success variable – private incubators



Source: author's elaboration

Legend: the score 1 stands for the answer "more than 50%"; the score 2 represents the answer "between 21% and 50%" while the score 3 is for "between 11% and 20%". Finally, the score 4 stands for "less than 10%".

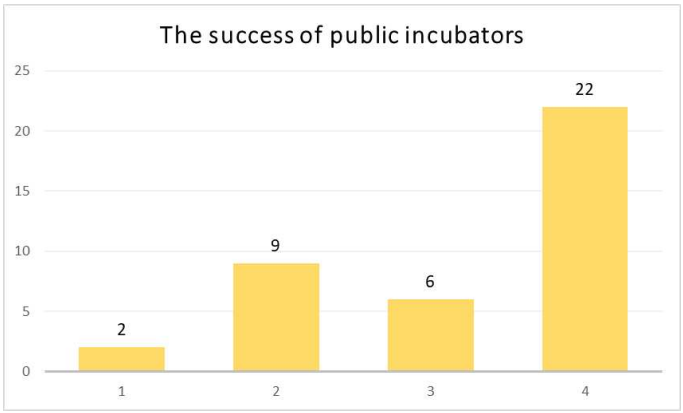
From Figure 3.3, we see that 38% of public incubators responded that the percentage of firms that failed during or at the end of the incubation process is less than 10%, while 34% of incubators report a percentage ranging from 11% to 20%. On the other hand, 28% of the incubators analyzed state that the percentage of failed companies exceeds 20%.

While, analyzing the frequency distribution of the success variable in public incubators (figure 3.4), 56% of the sampled public incubators stated that the

percentage of failed firms during or after the incubation process is less than 10%. While 9 out of 39 incubators stated that the percentage was between 21% and 50% and 6 out of 39 stated it was between 11% and 20%.

Overall, however, in both cases, more than 50% of the sample reported being successful.

Figure 3.4. Frequency distribution of the success variable – public incubators



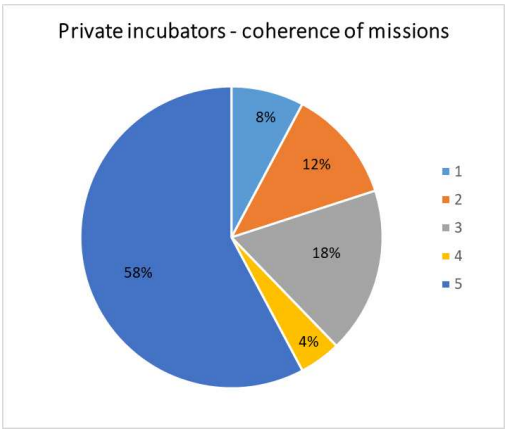
Source: author's elaboration

Legend: the score 1 stands for the answer "more than 50%"; the score 2 represents the answer "between 21% and 50%" while the score 3 is for "between 11% and 20%". Finally, the score 4 stands for "less than 10%".

After having generally analyzed the success of incubators in supporting startups, I decided to calculate the frequency distribution of the two control variables in both private and public incubators.

Initially, I analyzed the importance given to the selection criterion of consistency between the mission of the incubator and the business area in which the startup operates. From Figure 3.5, we can see that, adding up the percentages that refer to score 4 and 5, 62% of the incubators believe that this criterion is fundamental for choosing new ventures to incubate. While, among the public incubators (figure 3.6), which I remember being many fewer in terms of quantity, 59% consider the criterion important. It should be noted, however, that among private incubators, 20% of them say they do not consider the criterion important (sum of scores 1 and 2), and the same position is taken by 26% of public incubators.

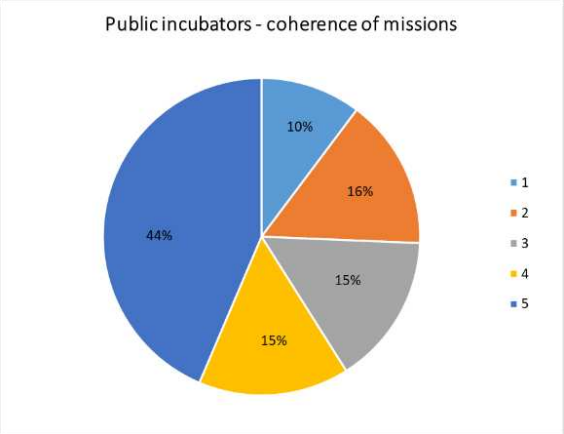
Figure 3.5. Frequency distribution of the selection criteria – private incubators



Source: author's elaboration

Legend: the scores go from 1 to 5 depending on the importance of the selection criteria. The more important the criterion has been declared, the higher the score.

Figure 3.6. Frequency distribution of the selection criteria – public incubators



Source: author's elaboration

Legend: the scores go from 1 to 5 depending on the importance of the selection criteria. The more important the criterion has been declared, the higher the score.

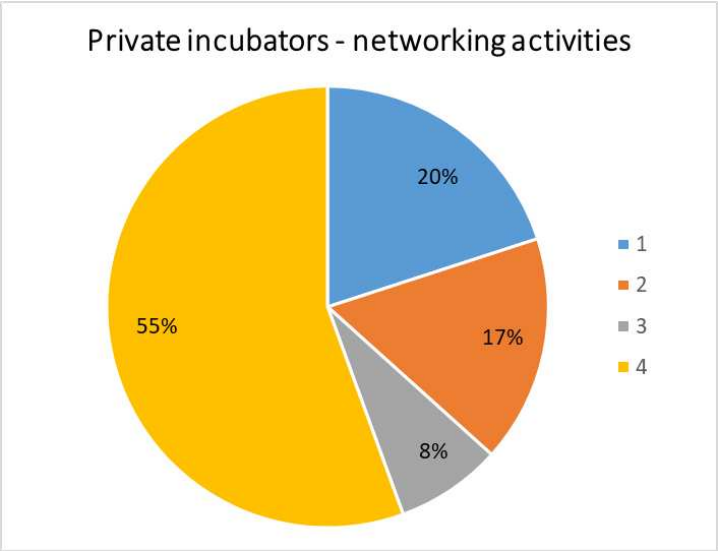
On the other hand, with regard to the provision of networking services (figure 3.7 and 3.8), 62% of private incubators offer the service, 89% of which offer the it

internally and 11% implement networking activities through external partners. By contrast, 37% of private incubators do not yet offer it.

It is not surprising to see that 77% of public incubators implement networking and partnership activities, while only 23% of them do not offer any such service yet. Considering, among other things, that public incubators are born within the territory and that their range of action is at the regional level, and considering that they aim to renew certain areas of the territory, it is normal that they have a network of contacts with external bodies and partners that is much more rooted and expanded than private and university incubators. In such a way as to offer, consequently, more developed networking and partnership activities.

While, private incubators, even if they have a range of action that also covers the international market, the literature review noted that they remain focused on specific sectors, thus having limitations in building an extensive and fluid network of contacts between different entities. The networking activities implemented will be limited to contact with other incubated startups. In addition, since they are considered sector-specific, many of them may not offer such a service because they focus their business on offering services that are highly specific to the sector in which they operate without considering contact with the external environment.

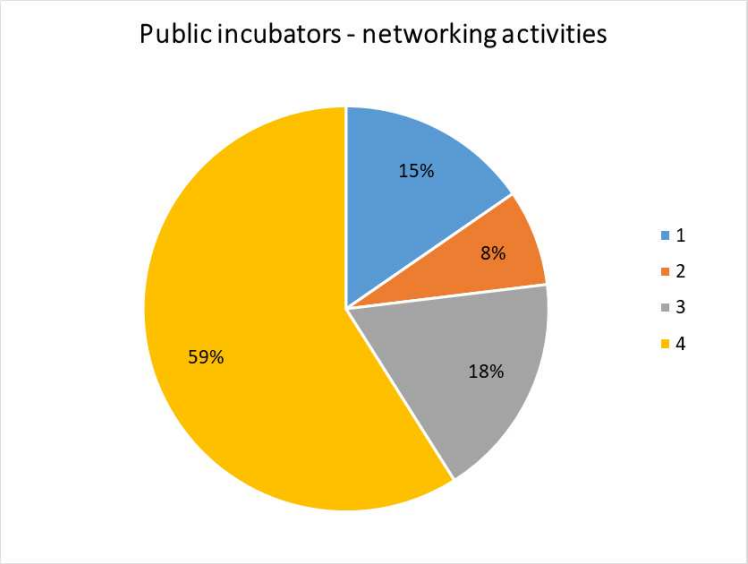
Figure 3.7. Frequency distribution of networking activities – private incubators



Source: author's elaboration

Legend: the score 1 means that the service is not offered. The score 2 reflects the fact that the incubator is in phase of organization to offer this service in the future. The score 3 means that the incubator offer this service through external partners, while the score 4 means that the service is offered by the internal staff.

Figure 3.8. Frequency distribution of networking activities – public incubators



Source: author's elaboration

Legend: the score 1 means that the service is not offered. The score 2 reflects the fact that the incubator is in phase of organization to offer this service in the future. The score 3 means that the incubator offer this service through external partners, while the score 4 means that the service is offered by the internal staff.

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3.3 Do the incubators' characterizing variables still exist?

After concluding that the regression model is highly significant for public incubators, while it is less significant for private and university incubators, and that while there is no substantial difference in the importance given to the selection criterion of mission coherence, there is a difference in the provision of networking activities that are more intense in public than in private incubators, I decided to assess whether there is still a difference between public and private incubators on the basis of the incubators' characterizing variables that are used in the study by Grimaldi and Grandi (2005).

To be more precise, in Table 1.2 of the literature review, you can find the incubators' characterizing variables on which the difference between private and public incubators is based. This table has been constructed after reviewing the study conducted by Grandi and Grimaldi that refers to the year 2005. Using the data in the questionnaire, I analyzed whether the difference between the types of incubators still exists in 2021. To do so, I divided the sample of 129 incubators according to their nature. So, I ended up with 3 categories: private, public, and mixed incubators. And through several pivot tables, I studied the sussistency of the variables.

But first, it should be noted that I did not test all of the characterizing variables, as I did not have all of the necessary data available. As a result, what was not tested

using empirical data was the location and target market in which the incubators operate, as well as the origin of the ideas and the stage at which the incubators intervene in supporting the startups.

The first pivot table concerns the study of the sector in which incubators operate (table 3.1). The literature review states that public incubators are multisectoral, that is to say that they don't operate in a specific industrial sector, while private incubators tend to be focused on a specific sector, depending on their missions.

Analyzing the situation, in general 81 incubators out of 129 operate in more than one sector. And, of these, 48% are private incubators. While only 23 out of 62 private incubators operate in a single sector.

So let's say that in 2021, the situation does not mirror the Grandi and Grimaldi's study in this variable. So, the fact that private incubators focus on specific industries and are not open to supporting startups in different industries is disproven. The same thing can be said for public incubators. Although 64% of them define themselves as multi-sector, the remaining 36% provide support for startups in specific industries.

Thus, in general, the relationship such that private incubators are sectoral and public incubators are multisectoral is not confirmed. It seems that to date there has been a trend of all types of incubators moving to different sectors.

Table 3.1. Pivot table – industrial sector

INDUSTRIAL SECTOR_	Multisectorial	Sectorial	Grand Total
mixed	17	11	28
Privat	39	23	62
Public	25	14	39
Grand Total	**81**	**48**	**129**

Source: author's elaboration

Table 3.2 instead refers to the length of the incubation period of startups form when they start the incubation process. To study this variable, from the survey I took the following question: "On average, how long businesses stay in your incubator? (Average of last 5 years)" with the following possible answers: less than six months, between six months and one year, between one and two years and more than two years.

From the literature review, the study says that the incubation period in public and university incubators is long run. While in private incubators it is identified as a short-run period of incubation. More in depth, long-run means a period of time beyond 2 years, while short-run means a period that goes from 6 months to 2 years.

The table shows that in both public and private incubators the incubated companies remain in the incubation process for at least one year. More in detail, 62% of public incubators state that their incubated companies remain for a period

ranging from one to two years, thus referring to a short period of time. While, 55% of private incubators report that their companies stay there for more than 2 years, thus referring to a long incubation period. As for mixed incubators, which represent the category of university incubators, only 1 incubator out of 28 states that their companies stay from 6 months to 1 year, while 61% of them state that the incubation period goes towards the long term, exceeding two years. Thus, it seems that, in general, between public and private incubators there is a reversal of trends with respect to what Grandi and Grimaldi stated, except for university incubators, which incubate new ventures primarily for long periods.

This information is important because it lets us know that private incubators hold startups for longer and provide more long-term support. This phenomenon could be attributed to advancing times, and the fact that there is a clear need for today's startups to receive support over the long term. But can be also interpreted negatively, as one may wonder why startups fail to become autonomous after 2 years of incubation. The question becomes even more complex if one takes into account that public incubators retain companies for less time. Could it be a question of contracts and limitations imposed at a national level? Could it be that, since their main source of funding is based on national and European funds, perhaps these impose time limits on support for startups?

Table 3.2. Pivot table – incubation period

INCUBATION PERIOD_	between 6 months and 1 year	between 1 and 2 years	more than 2 years	Grand Total
mixt	4%	36%	61%	100%
Privat	0%	45%	55%	100%
Public	0%	62%	38%	100%

Source: author's elaboration

The other characterizing variable concerns the source of revenue of the incubators. To test this variable, from the survey I took the following question "How the costs of running the incubator are covered?" The possible answers are as follows: Fee paid from businesses for services provided, public funding/European funds/national funds, royalty and shareholding, crowdfunding, other. Each of the answer has 4 ranges of percentages. The single incubator has to declare in which percentage they cover their running costs using each source of revenues.

From the literature review, it is stated that private incubators have the majority of their revenues coming from fees paid by companies as consideration for services rendered and from shares owned. While, as far as public and university incubators are concerned, their sources of revenues come from public funding and fees obtained from pay-per-use services.

In order to test with empirical data the assumptions taken from the literature review, let's analyze the table 3.3.

First, the table is composed of 4 quadrants and each of them refers to a source of revenue. Going from up to down and from left to right, the first quadrant refers to the consideration received by incubated firms as a result of the services provided. In general, all incubators cover their operating costs with this source of revenue for a percentage that is lower than 15%.

In detail, this form of remuneration is used more by private and mixed incubators than public ones. In fact, 62% of public incubators say they use this method to cover less than 15% of their operating costs. While, as far as private incubators are concerned, although 39% claim to cover their management costs with this form for less than 15%, 50% of them claim to use it to cover costs for a percentage ranging from 16% to 50%. In addition, it must be said that a not-to-be-overlooked percentage of public incubators (23%), use this method to cover more than 51% of their operating costs.

Analyzing the use of royalties and shareholding, 90% of public incubators claim to use this method very little, while 35% of private incubators use it to cover a percentage of their operating costs that ranges from 26% to 50%, thus claiming it to be their predominant method of earning money. We can therefore say that this figure is totally in line with what is written in the literature review.

Moving on to the third quadrant, the use of public and European funds is more widespread in mixed incubators, i.e. university incubators. 43% of them use it to finance between 26% and 50% of their operating costs, and 36% cover more than 51% through the use of public and European funds.

Great use is also made by public incubators, among which more than half use this method to cover more than 51% of their operating costs.

Moving to the last quadrant, we see that university incubators also fund themselves through the use of crowdfunding. This, in fact, is used by 39% of university incubators to cover between 26% and 50% of their operating costs. While, as far as public incubators are concerned, 62% cover less than 15% of their costs with it. Considering the private incubators, 28 of them do not use the method as prevalent, but another 25 there covers the management costs between 26% and 50%.

To conclude on the revenue sources that are used by incubators, I have summed up the percentages that refer to the use of the methods to cover from 26% upwards of the incubator's management costs. Regarding the first method, and therefore the fees for services offered, about 30% of incubators, both public and private, use them. While for university incubators, this is not the main revenue source. This is understandable considering that public and private incubators offer various services to companies which they are paid for, while university incubators transfer

knowledge through human capital and research services, thus mostly intangible, and often offer them to university spin-offs.

Regarding the use of royalties and shareholding as a method of generating revenues, this is in total agreement with the literature review, as I mentioned earlier. 41% of private incubators use this as their predominant method, while among public incubators, only 6% overall.

Obviously, the use of national or European fundings is more used by public and university incubators, with 85% of public and 79% of mixed incubators using this source to cover more than 26% of their operating costs. And this again reflects Grandi and Grimaldi's study.

Whereas, the empirical data adds the new crowdfunding method mostly used by private and university incubators. While in 2005 the method was not even mentioned, today we can see that it is used for social causes but also as a means of supporting scientific and technological research. So, consequently, reflecting current times, cutting-edge companies that keep up with the times are using the method more and more.

In any case, in general, the empirical data reflect the study of Grandi and Grimaldi giving an extra twist and adding crowdfunding to the methods used for financing themselves.

Table 3.3. Pivot table – sources of revenue

SOURCES OF REVENUE: paid by incubated companies	less than 15%	between 16% and 25%	between 26% and 50%	more than 51%	Grand Total
mixt	18	7	3		28
Privat	24	17	14	7	62
Public	24	2	4	9	39
Grand Total	**66**	**26**	**21**	**16**	**129**

SOURCES OF REVENUE: royalty and shareholding	less than 15%	between 16% and 25%	between 26% and 50%	more than 51%	Grand Total
mixt	23	2	2	1	28
Privat	22	14	22	4	62
Public	35	2	1	1	39
Grand Total	**80**	**18**	**25**	**6**	**129**

SOURCES OF REVENUE: public or EU funds	less than 15%	between 16% and 25%	between 26% and 50%	more than 51%	Grand Total
mixt		6	12	10	28
Privat	22	9	22	9	62
Public	5	1	12	21	39
Grand Total	**27**	**16**	**46**	**40**	**129**

SOURCES OF REVENUE: crowdfunding	less than 15%	between 16% and 25%	between 26% and 50%	Grand Total
mixt	5	12	11	28
Privat	28	9	25	62
Public	24	6	9	39
Grand Total	**57**	**27**	**45**	**129**

Source: author's elaboration

The next variable to test is the degree of involvement of the incubator in the support of startups. The study of Grimaldi and Grandi states that private incubators are more directly involved than public incubators, in the sense that they invest their own resources in them. Instead, the public ones are considered more as intermediaries between the new ventures and the external world.

The empirical data are synthetized in the table 3.4 and you can observe that at a first sight, the study of 2005 is confirmed. In fact, just 1 public incubator over 39 acquires company shares, while 7 of them do not benefit from the any of the current/prospective economic performance of the incubated companies. While 31 incubators use other method for benefitting from the performances of the companies. Among the private incubators, 25 of them acquire company shares, 5 of them benefit from their performance thanks to revenue sharing and 24 declare to be involved in the incubatees' performances in other ways. While just 8 incubators over 62 don't benefit from any incubatees' result.

So, if we consider the involvement of the incubator in the startup survival just as acquisition of company's share, in this sense the statement of the Grimaldi and Grandi is confirmed. But considering the involvement of the incubator in a broad sense, the statement is a bit limiting. The category "other" in this set of answer has been used most than all the other available ones.

This means that, in a way or in another, almost all incubators, regardless of their origin, benefit from the outcomes of the enterprises they support. Thus, all of

them should be considered as directly involved rather than just intermediaries in the market, because the interest in the company growth is deeper than that of simple intermediaries in the market.

The interesting fact in this pivot table is that 40% of the private incubators in the sample acquire company shares, and this could be a sign that these 25 incubators are Corporate Business Incubators, with the objective of supporting their new business units, called corporate spin-offs.

Table 3.4. Pivot table. Degree of involvement of startup support.

MANAGEMENT TEAMS	Acquisition of company shares	Through forms of revenue sharing	No way	Other	Grand Total
mixt	4	4	5	15	28
Privat	25	5	8	24	62
Public	1		7	31	39

Source: author's elaboration

As a conclusion of this section, it can be stated that the difference between public and private incubators is not as obvious as in the past. The nature of the incubator is different, but with the passage of time, all incubators have adapted to the new needs of startups. It can be said that the way of thinking about incubation has changed. Whereas before, incubation methods were different and based on the

type of services offered, today everyone offers the same services to meet the needs of the market.

For example, previously public incubators were focused on offering only tangible services, such as space and facilities, while private incubators targeted new ventures by offering management expertise, intellectual property management, marketing and mentoring services.

Today, as you can see in Table 3.5, all types of incubators offer the same services. The difference between incubators, therefore, lies only in the different missions, in the different goals they set with their incubation programs, and in the different sectors in which they operate. Startups to date choose to applying to one incubator over another, just because one meets their needs more precisely than another.

Table 3.5. Pivot table. Services offered by private and public incubators

LEGAL SERVICES				LEGAL SERVICES			
	not offered	offered	Grand Total		not offered	offered	Grand Total
Public	22%	78%	100%	mixt	7%	93%	100%
				Privat	21%	79%	100%
INTELLECTUAL PROPERTY MANAGEMENT				INTELLECTUAL PROPERTY MANAGEMENT			
	not offered	offered	Grand Total		not offered	offered	Grand Total
Public	35%	65%	100%	mixt	18%	82%	100%
				Privat	31%	69%	100%
MARKETING SERVICES				MARKETING SERVICES			
	not offered	offered	Grand Total		not offered	offered	Grand Total
Public	19%	81%	100%	mixt	11%	89%	100%
				Privat	13%	87%	100%
TUTORING SERVICES				TUTORING SERVICES			
	not offered	offered	Grand Total		not offered	offered	Grand Total
Public	5%	95%	100%	mixt	0%	100%	100%
				Privat	8%	92%	100%
FACILITIES AND OFFICE				FACILITIES AND OFFICE _			
	not offered	offered	Grand Total		not offered	offered	Grand Total
Public	5%	95%	100%	mixt	7%	93%	100%
				Privat	15%	85%	100%

Source: author's elaboration

4. CONCLUSION

The main objective of this thesis at the beginning was to prove the existence of factors that determine the success of incubators in the creation and development of new ventures.

To do this, through the literature review I defined what an incubator is and then the reference model for the study of the incubation process, defined by Hackett and Dilts as the set of activities of new venture development, new product development, selection, monitoring and business assistance, and resource munificence. In order to define the output of the incubation process, I have defined which are the incubated companies resulting from the process, studying the notion of startup and spin-off. In this sense, considering that the objective is to define the success of incubators for the research of the variables that influence it positively, I analyzed what are the performance measures that allow to identify successful startups. Here, the first challenge is the fact that studies to date only list what causes startups to fail, regardless of whether they are part of an incubation program or not. Hence the first gaps in the literature.

In studying the factors that lead to startup failure, it turns out that there is no way to tell if the presence of incubators can obviate these causes and prevent startups from failing immediately after the incubation process.

What has emerged, however, is that the main causes of startup failure are related to a poor connection of startups with the territory in which they operate. For example, the first cause is the lack of money for further investments, which is linked to the fact that companies do not have solid sources of funding to invest in the growth itself. Another cause, directly related to the first, is the fact that there are few investors who believe in the startup, then causing a lack of funds to finance the company.

After defining incubators and the incubation process, it seems clear that the causes of failure listed here can be remedied by the presence of incubators, due to the fact that incubators support startups through the provision of management expertise and support in accessing necessary funding sources.

However, some difficulties related to the availability of information emerged. The first is that there is no data available on the number of incubated firms and the number of successful firms after the incubation period. The second difficulty is related to the fact that there is no way to define the success of the incubation process and that this can be based on multiple factors, which should be chosen at the discretion of the researcher and based on the research objective.

Thus, through the construction of an empirical model, I first gave a definition of success of the incubation process as "the least number of firms that cease operations during or at the end of the incubation process." And, subsequently, I sought a correlation between this variable, that is the observed variable, and the

control variables that were defined using data taken from a questionnaire with a sample of 129 incubators answering a series of questions.

In choosing which control variables to select for the formation of a regression equation, I based the choice on measures of incubator performance that relate to community support, the entrepreneurial network and university ties, the entrepreneurial education, the activities of financial support and institutional funding, the selection criteria and the activities of incubatees' monitoring, and finally the on-site business expertise. But this set of performance measures is too long and also contains basic services offered by incubators, which are not actually the basis for success.

Indeed, performing regression analysis, I found a significant correlation between two control variables for determining the success of the incubation process. They are the networking activities considered in a broad sense and the selection criteria of the incubated companies based on the consistency between the mission of the incubator and the business area of the incubated company.

It is important to note that the concept of networking in relation to incubators first appeared in 1991. In fact, among the definitions of incubators, Weinberg defined them as inter-organizational that address to social relevant purposes and exploit the strength from the various actors in the market. Thus, for the first time he started to think of these actors as intermediaries of innovation; and this concept was emphasized again in the empirical model. This suggests that the fact that the

incubator is well linked to different players in the market and well related to the environment in which it operates is a key factor that makes the difference between successful and unsuccessful incubators.

In addition to this, there are several interesting aspects resulting from the empirical model.

First of all, it must be emphasized that the difference between incubators in building a successful incubation process is based only on the two control variables. This implies that we are not talking about certain characteristics that are recognized only to certain types of incubators, but that they are variables that all types of incubators may or may not have.

This is also confirmed by the reflections resulting from the analyses carried out in the third chapter. In fact, in 2005 with the aim of defining incubators, Grimaldi and Grandi's study subdivided them according to their nature and assigned to each type a series of characteristics based on precise traits, also called incubator characterizing variables. To understand whether this differentiation was still present today, I analyzed the empirical model constructed in chapter two by dividing the sample into private and public incubators, and then analyzed whether the difference between incubators was still based on incubator characterizing variables. The result that is laid out in chapter three clearly contradicts what is proven in Grimaldi and Grandi's model.

In fact, it must be said that in the literature, reference has been made to the fact that private incubators better meet the needs of start-ups because they have certain characteristics that respond to the innovation needs of new businesses. But, thanks to the study conducted with empirical data referring to the present day, it can be seen that the success of incubators cannot be based on whether or not they offer certain services but is based on the exact correspondence between what the startup asks for and what the incubator offers. The difference between a public incubator and a private one lies only in their source of income and in their range of action in the territory. In the innovation landscape, relationships with the market are fundamental and for SMEs and startups an open innovation approach is the key to maintaining high performance in the market.

Furthermore, the choice of companies to incubate cannot be based only on assessments of their potential success, but incubators must above all consider what the startup's vision for the future is and verify that it is in line with what the incubator can offer.

In general, evaluating the performance of incubators has been the subject of many studies that have acknowledged the fact that the task is indeed challenging. Starting with the difficulty of understanding what "performance" really means to a general lack of large-scale empirical evidence on the success of business incubation programs due to the limited availability of data on incubated and non-incubated firms. But what is clear is that the model constructed by Hackett and

Dilts (2008), which bases the business incubator's performance, among other control variables, on the selection of promising new ventures, is contradicted by my empirical model.

Thus, at the conclusion of my thesis project, these are my final suggestions on how to run a successful incubator. First, there should be a full understanding of what the goals of the incubation program are and ensure that both parties involved have the same realistic expectations of the outcomes of the process so that it is mutually beneficial. Second, a strong entry criterion based on both parties' compatibility assessment would strengthen the relationship between them. Third, incubators should study their business model based on the demand for services that exists in the market in which they operate, in order to ensure the success of their incubation programs and the real support of the startups that apply to their programs. Finally, as already stated, the incubator should be well integrated with the development policy and innovation initiatives of the territory; so as to create a favorable eco-system for the incubated startups.

In general, it must be specified that the innovation market contains a lot of heterogeneity, and there is no perfect way to incubate companies and to ensure that the incubation process is successful.

Today we talk about different types of incubators, such as virtual incubators, indie incubators or sustainable ones. This emphasizes the fact that being a generic

incubator offering basic services, in an innovation market that is increasingly specialized, does not lead to an efficient incubation process.

In conclusion, my intention is not to change the way the incubation model has been described by previous studies, I just want to draw attention to the fact that we are not talking about "factors" but "attitudes" that make a difference in supporting startups.

REFERENCES

Akcomak, S. (2009). *Incubators as tools for enterpreneurship promotion in developing countries.* Maastricht Economic and social research and training centre on Innovation and Technology. United Nations University.

Allen D.N., Rahman S. . (1985). Small Business Incubators: A Positive Environment for Entrepreneurship. *Journal of Small Business Management*, 12 - 22.

Ayatse F.A., Kwahar N., Iyortsuun A.S. (2017). Business incubation process and firm performance: an empirical review. *Journal of Global Entrepreneurship Research*.

Bednar R., Tariskova N. (2017). Indicators of startup failure. *International Scientific Journal "Industry 4.0"*.

Bollingtoft A., Ulhoi J.P. (2005). The networked business incubator - leveraging enterpreneurial agency? *Journal of Business Venturing*, 265 - 290.

Campbell C., K. R. (1985). *Stalking the latent entrepreneur: business incubators and economic development.* Economic Development Review.

Campbell, C. (1989). Change Agents in the New Economy: Business Incubators and Economic Development. *Economic Development Review*, 56 - 59.

Corporate Finance Institute (2021) *Spin-Off. A parent company creates a new business, keeps ownership*. Retrived from: https://www.corporatefinanceinstitute.com/resources/knowledge/finance/spin-off-and-split-off

Gassman O., Enkel E., Chesbrough H. (2010). *The future of open innovation.* R&D Management.

Global Startup Ecosystem Report 2019 with New Life Sciences Ecosystem Ranking. (2019). Retrieved from Genome Startup.

Grimaldi R., Grandi A. (2005). Business incubators and new venture creation: an assessment of incubating models. *Technovation*, 111 - 121. Retrieved from http://www.sciencedirect.com

Hackett S. M., Dilts D. M. . (2004a). A systematic review of business incubation research. *Journal of Technology Transfer*, 55 - 82.

Hackett S. M., Dilts D. M. (2008). Inside the Black Box of Business Incubation: Study B - Scale Assessment, Model Refinement, and Incubation Outcomes. *Journal of Technology Transfer*.

Khan M.N., Baharun R., Rahim K.A., Zakuan N. (2011). An empirical evidence of performance measurement of audit firms in Malaysia. *International Business Research*, 191 - 198.

Malina M.A., Selto F.H. (2004). *Choice and change of measures in performance measurement models.* Management Accounting Research.

Mise. (2021). *Startup innovative: tutti i dati al 1° gennaio 2021*. Retrieved from https://www.mise.gov.it/index.php/it/198-notizie-stampa/2041934-startup-innovative-tutti-i-dati-al-1-gennaio-2021

Neely A., Gregory M. Platts K. (2005). Performance Measurement System Design: A Literature Review and Research Agenda. *International Journal of Operations and Production Management*.

Phan H.P, Siegel D.S., Wright M. (2005). Science parks and incubators: observations, synthesis, and future research. *Journal of Business Venturing*, 165 - 182. Retrieved from htttp://www.sciencedirect.com

Shankar R.K., Shepherd D.A. (2019). Accelerating strategic fit or venture emergence: Different paths adopted by corporate accelerators. *Journal of Business Venturing*.

Smilor, R. (1987). *Managing the incubator system: critical success factors to accelerate new company development.* IEEE Transactions on Engineering Management.

Temali M, C. C. (1984). *Business Incubator Profiles: A National Survey.* University of Minnesota. Hubert H. Humprey Institute of Public Affairs.

Winberg M.L., Allen D.N., Schermerhorn J.R. (1991). *Interogranizational challenges in the design and management of business incubators.* Policy Studies Review.

Zuluaga G., Eugenia M., Morales B., Carlos J. . (2007). *Startup y spinoff: una comparación desde las etapas para la creación de proyectos empresariales.* . Universidad Pontificia Bolivariana. Revista ciencias Estratégicas.

ACKNOWLEDGEMENTS

This paper marks the end of two intense years that flew by at lightning speed. I remember that after months of research and various evaluations, I jumped into this master's degree without thinking about what I was going to get into. I just followed my gut, trying to get out of that comfort zone that was starting to get tighter and tighter.

It was 2019, and we could still hug each other without having the anxiety of dying from a disease contractible with a gesture that we – as Italians – consider basic, a handshake. Today is October 2021 and despite the enormous progress of science and the discovery of vaccines that can make us breathe a little, we are still here with the fear and anxiety that any day now it could all end. And I believe that this is the feeling that will remain imprinted, always, and forever, in each of us. We will always carry that restlessness, that insecurity, that concern in making gestures previously dedicated only to love and respect… In short, to positive emotions.

Today more than ever we know what it means to be grateful for being alive. For this reason, the first thanks goes to life. Thank you because, despite everything, I am here, with a healthy body, with a shining mind, achieving one of the most important goals of my life.

Now I would like to dedicate a few lines to those who contributed to the realization of this thesis. First, thank you to Prof. Ralf Dillerup who, from day

one, supported and guided me throughout my permanence at Heilbronn University. Professor, I can say with certainty that without you I would never have the possibility to obtain this double degree. The other thanks go to Prof. Gilles Van Wijk who, with infinite patience, supported me during these months and always directed me towards the right path thanks to his precious advice.

But if it is true that professors guide you and direct you towards the future, it is also true that in everyday life the steps are taken together with those who are formally called peer-colleagues, but who are and always be pieces of my heart. Thank you, Mara, Simo, Lori and Mazza. You have been the light in the dark days, the smile and the light-heartedness in the more serious moments and the shoulder to lean on when I occasionally stagger.

Finally, I would like to close this thesis by thanking the most important people in my life. As I always say, they are **my** people. Thank you so much to my family for their support, understanding and constant presence since day zero. Without you I would have never been able to achieve this great goal. Thank you, Mom, Dad, Menny and Cha. You are my whole heart.

RINGRAZIAMENTI

Questo elaborato segna la fine di 2 anni intensi che sono volati alla velocità della luce. Ricordo che dopo mesi di ricerca e valutazioni varie, mi sono buttata in questa laurea magistrale senza pensare a cosa sarei andata incontro. Ho solo seguito il mio istinto, tentando di uscire da quella zona di comfort che cominciava ad essere sempre più stretta.

Era il 2019, e ancora potevamo abbracciarci senza pensieri e senza avere l'ansia di morire per una malattia contraibile con un gesto che noi italiani consideriamo basilare, una stretta di mano. Oggi è Ottobre 2021 e nonostante gli enormi progressi della scienza e la scoperta di vaccini che possono farci respirare un po', siamo ancora qua con la paura e l'ansia che da un giorno all'altro possa finire tutto. E credo che questo sia il sentimento che rimarrà impresso, sempre e per sempre, in ognuno di noi. Ci porteremo sempre quell'inquietudine, quell'insicurezza, quella preoccupazione nel compiere dei gesti prima dedicati solo all'amore e al rispetto. In poche parole, alle emozioni positive.

In sostanza, oggi più che mai sappiamo cosa significhi essere grati per esser vivi. Per questo motivo, oggi, il primo ringraziamento va alla vita. Grazie perché, nonostante tutto, io sono qui, con un corpo in salute, con la mente splendente, a realizzare uno dei traguardi più importanti.

Ora vorrei dedicare qualche riga a coloro che hanno contribuito alla realizzazione di questa tesi di laurea. In primo luogo, grazie al prof. Ralf Dillerup che, sin dal primo giorno, mi ha supportata e guidata durante tutto il periodo di permanenza presso la Heilbronn University. Posso affermare con certezza che senza di lei non sarebbe stato possibile ottenere questo doppio titolo. Mentre l'altro grazie va al Prof. Gilles Van Wijk che con infinita pazienza mi ha supportata in questi mesi e indirizzata sempre verso la strada più giusta grazie ai suoi preziosi consigli.

Ma se è vero che i professori ti guidano e ti indirizzano verso il futuro, è anche vero che nella quotidianità i passi vengono percorsi insieme a coloro che formalmente vengono chiamati i colleghi, ma che in effetti sono dei pezzi di cuore che rimarranno sempre. Grazie Mara, Simo, Lori e Mazza. Siete stati la luce nei giorni bui, il sorriso e la spensieratezza nei momenti più seri e la spalla su cui appoggiarmi quando ogni tanto barcollavo.

Infine, vorrei chiudere ringraziando le persone più importanti della mia vita, le mie persone. Grazie infinitamente alla mia famiglia per il sostegno, la comprensione e la presenza costante, sin dal giorno zero. Senza di voi non sarei mai riuscita a realizzare questo grande traguardo. Grazie Mamma, Papà, Menny e Cha. Siete tutto il mio cuore.