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Incubation activities in Emilia-Romagna: Analysis of a regional entrepreneurial ecosystem



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Table of Contents

T	able of	f Con	tents	3
1.	Int	roduc	ction	8
2.	Lit	eratu	re analysis	. 11
	2.1.	Inn	ovation and Entrepreneurial ecosystems	. 11
	2.1	.1.	Core elements of an Entrepreneurial Ecosystem	. 13
	2.1	.2.	Dynamic process of entrepreneurship	. 16
	2.2.	Def	inition of incubator	. 17
	2.3.	Ser	vices provided to supported organizations	. 18
	2.4.	Sou	rces of income and costs for incubators	. 22
	2.5.	Incu	ubators typologies	. 23
	2.5	.1.	Public Incubators	. 24
	2.5	.2.	Private Incubators	. 27
	2.5	.3.	Business, Social and Mixed Incubators	. 32
	2.6.	Acc	elerators	. 34
	2.7.	Ope	en innovation	. 35
	2.7	1.	Entrepreneurship in an open environment	. 37
	2.8.	Lan	dscape in Italy	. 40
	2.8	1.	SIM and ART-ER	. 40
	2.8	.2.	The Italian landscape	. 40
3.	Me	thodo	ology	. 43
	3.1.	Upc	lating the list of incubators	. 44
	3.2.	Sett	ing up the database	. 44
	3.3.	Cre	ation of the survey	. 46
	3.4.	Sur	vey submission	. 48
	3.5.	Dat	a analysis	. 50
4.	An	alysis	and results	. 51
	4.1.	Incu	ubators' mapping	. 52
	4.1	.1.	The analyzed sample	. 52
	4.1	.2.	Geographical distribution	. 54
4.2. Emilia-Romagna and the rest of Italy			ilia-Romagna and the rest of Italy	. 56
	4.2	.1.	Year of foundation	. 57
	4.2	.2.	Requests received and organizations incubated	. 58
	4.2	.3.	Number of employees in incubated organizations	. 61
	4.2	.4.	Services offered	. 62

	4.2.5.	Compensation for access to incubation programs		
	4.2.6.	Funding received by incubated organizations		
	4.2.7.	Revenue structure		
4.3. Insight into Emilia-Romagna				
	4.3.1.	Origin of incubated entities		
	4.3.2.	Incubated subjects beneficiaries of European funds73		
	4.3.3.	Subjects incubated registered as innovative startups in the Business Registry 74		
	4.3.4.	Subjects incubated with university spinoffs74		
	4.3.5.	Subjects incubated for more than three years75		
	4.3.6.	Subjects incubated with exports or international collaborations76		
	4.3.7.	Patents filed by incubated subjects		
	4.3.8.	Average revenues of incubated subjects77		
	4.3.9.	Number of employees and partners of incubated startups78		
	4.3.10.	Staff composition of incubated subjects		
	4.3.11.	Active contracts and agreements among regional ecosystem entities		
	4.3.12.	Open innovation programs organized by the entities		
	4.3.13.	Open innovation programs organized by other private entities		
	4.3.14.	Relations of entities with incubators in other countries		
	4.3.15.	Public funding received by entities		
5.	Conclusi	ion		
6.	Appendi	ix A		
Bib	liography	97		

List of Figures

Figure 1: Isenberg's model of an entrepreneurship ecosystem (Isenberg 2011; Mason	
and Brown 2014)	14
Figure 2: Dynamic process of entrepreneurship (Aernoudt, 2004)	16
Figure 3: Technology based incubator, the interplay between innovation and business	
assistance (Lalkaka, 2000)	19
Figure 4: Two incubating models (Grimaldi and Grandi, 2005)	30
Figure 5: Closed and Open Innovations Model	36
Figure 6: Number of incubators in reference to km ² by region	42
Figure 7: Emilia-Romagna - Population and analyzed sample	52
Figure 8: Emilia-Romagna - Population and sub-sample analyzed for comparisons wit	h
the rest of Italy	53
Figure 9: Rest of Italy - Population of incubators and accelerators in Italy, excluding	
Emilia-Romagna, and sample analyzed	53
Figure 10: Emilia-Romagna – Geographical distribution of the organizations	55
Figure 11: Emilia-Romagna - Year of foundation and age of the entities in the sample	57
Figure 12: Emilia-Romagna - Number of incubation requests received by sample	
institutions in 2021	59
Figure 13: Emilia-Romagna - Number of startups incubated by sample institutions in	
2021	60
Figure 14: Emilia-Romagna - Number of employees of the entities in the sample in	
2021	61
Figure 15: Regional comparison - Completeness of services offered by institutions in	
2021	63
Figure 16: Emilia-Romagna - Spaces made available by the entities in the sample in	
2021	65
Figure 17: Regional comparison - Percentage of institutions ¹⁸ that required a	
participation fee in 2021	66
Figure 18: Regional comparison - Percentage of institutions ¹⁸ that required an equity	
share in 2021	67
Figure 19: Regional comparison – Entities ¹⁸ that applied for corporate shares during	
2021	68
Figure 20: Regional comparison ¹⁸ - Purpose of corporate holdings in 2021	69
Figure 21: Emilia-Romagna - Distribution by institution of funding raised by incubate	d
entities in 2021	70
Figure 22: Emilia-Romagna - Division of institution revenues in 2021	71
Figure 23: Emilia-Romagna - Division of institution revenues in 2021	71
Figure 24: Emilia-Romagna - Origin of entrepreneurial teams and startups incubated in	n
2021	73
Figure 25: Emilia-Romagna - Incubated subjects in 2021 beneficiaries of European	
funds	73
Figure 26: Emilia-Romagna - Startups incubated in 2021 registered in the special	
section of the business registry	74
Figure 27: Emilia-Romagna - Subjects with university spinoffs in 2021	75
Figure 28: Emilia-Romagna - Subjects per sample institution incubated for more than	
three years in 2021	75
Figure 29: Emilia-Romagna - Incubated entities at sample institutions with internation	al

Figure 30: Emilia-Romagna - Subjects incubated at sample institutions with patents
filed as of 2021
Figure 31: Emilia-Romagna - Staffing composition of incubated entities by sample
institutions in 2021
Figure 32: Emilia-Romagna - Share of entities in the sample with active
contracts/conventions with other ecosystem entities in 2021
Figure 33: Distribution of the number of contracts and agreements by entity in the
sample in 2021
Figure 34: Emilia-Romagna - Sample entities participating in open innovation programs
with private entities in 2021
Figure 35: Emilia-Romagna -No. companies with which entities organized open
innovation programs in 2021
Figure 36: Emilia-Romagna - Sample entities participating in open innovation programs
of other private entities in 2021
Figure 37: Emilia-Romagna -No. private entities with which open innovation programs
were organized in 2021
Figure 38: Emilia-Romagna - Entities in the sample having relationships with
incubators in other countries in 2021
Figure 39: Emilia-Romagna -No. subjects with whom relationships were active in 2021
Figure 40: Emilia-Romagna - Sample entities receiving public funds in 2021

List of Tables

Table 1: The Evolutionary Stages of a Business Ecosystem (Moore, 1999)	12
Table 2: Incubators distribution on Italian soil - comparison between 2012 and 2020	41
Table 3: Incubators distribution on Emilia-Romagna soil - comparison between 2012	
and 2020	42
Table 4: Regional comparison - Regional number of incubators and accelerators in 20)21
	54
Table 5: Emilia-Romagna – Geographical distribution of the population and sample	
analyzed.	55
Table 6: Regional comparison - Concentration of incubators in 2021	56
Table 7: Regional comparison - Year of foundation of entities	58
Table 8: Regional comparison - Incubation and acceleration requests received from	
institutions	59
Table 9: Regional comparison-Number of incubated and accelerated startups	61
Table 10: Regional comparison-Number of employees in institutions [FTE]	62
Table 11: Weight attributes to the single selection	62
Table 12: Emilia-Romagna - Square meters available for incubation and acceleration	
activities	64
Table 13: Regional comparison - Square meters available for incubation and	
acceleration activities	65
Table 14: Emilia-Romagna-Request for participation fee or equity by entities in 2021	66
Table 15: Regional comparison - Funding received by incubated and accelerated	
startups in 2021	70
Table 16: Emilia-Romagna - Revenues of incubated startups during 2021	77
Table 17: Emilia-Romagna - Number of workers in startups incubated during 2021	78
Table 18: Emilia-Romagna - Share of public funding received by entities in the sample	le
in 2021	85

1. Introduction

Innovation is seen to be the primary factor in an economy's ability to generate significant wealth, therefore it is crucial to encourage the growth of innovation ecosystems. An innovation ecosystem is a collection of networks made between various players with the primary purpose of fostering the advancement and innovation of technology (Deborah J. Jackson, 2011). Close to the concept of the innovation ecosystem, there is the idea of the entrepreneurial ecosystem (EE). According to the ecosystem model, entrepreneurship grows and occurs within a community with a variety of participants who share knowledge with one another in an effort to generate new value. Ecosystems may occur at several geographical scales, including the state, the city, and even the campus of a university. Despite the fact that ecosystems might vary, for one to be classified as such, it must have institutions of higher learning and research and development, as well as robust commercial infrastructures and support services. In addition, there must be public policies that encourage venture development and access to investment funds, all infused with a strong entrepreneurial culture (Colombelli, Paolucci, & Ughetto, 2019).

It is inside the Entrepreneurial Ecosystem that incubators and accelerators find their *'raison d'être'*. The existence and operation of an incubator, along with the network of business angels, encourage the growth of entrepreneurial activities. At the same time, business angel contact promotes entrepreneurial activities both directly and indirectly through projects housed within incubators. Also, a thriving entrepreneurial environment encourages the emergence and expansion of new technology-based companies (NTBF), which, once established, will support entrepreneurship and, ultimately, drive additional ideas into incubators. The dynamics of entrepreneurship are represented by this vicious loop, which can be encouraged by governmental initiatives (Aernoudt, 2004).

The American National Business Incubation Association (NBIA) defined a business incubator as "facilities that provide shared resources for young businesses, such as office space, consultants, and personnel. They may also provide access to financing and technical support. For new businesses, these services provide a more protected environment in which to grow before they become self-sustaining." (Inc., 2020).

Both public and private incubators exist. Public incubators are organizations run by institutional or public bodies with the aim of fostering regional economic development; in particular, they support job creation and economic growth in a specific area, and they primarily use public resources. Public incubators were the first typology of incubators to

be created and that initially attracted attention. Private incubators, to the contrary, are businesses that are entirely run by private parties and can be either profit- or fee/equityoriented. Private incubators can generate income in a variety of ways, such as collecting service fees or taking a cut of the profits generated by the firms they support. A private incubator's goal is to fast launch new businesses in exchange for a fee that is paid out of the equity of the businesses that are released. They provide chances to get professional business counsel, a network of crucial players, and infrastructure. Finally, they reduce the amount of time the business needs to spend getting ready for a trade sale or IPO.

Finally, it is important to mention that, according to some scholars in the recent years a new incubation model has been developed to help new digital ventures early in their lifecycle: the accelerators (Van Hove, 2018). Accelerators are regarded as the most recent generation of incubators. However, because there are no explicit distinctions made between incubators and accelerators in the literature, the scope of the study will regard them as synonyms.

Through the recent Growth Decree 2.0, which recognizes the importance of incubators and accelerators institutions as a fertile environment for the birth and development of innovative start-ups and a useful tool for the development of quality entrepreneurship, the business incubation sector in Italy seeks to be improved and developed in order to pursue the ambitious goal of making Italy the next Start-Up Nation.

In order to track the key characteristics and accomplishments of incubation entities, or incubators, Social Innovation Monitor (SIM), a group of academics led by professor Landoni of the "Politecnico di Torino", began examining the incubation phenomena in Italy in 2017.

As concern Emilia-Romagna, ART-ER (Attrattività Ricerca Territorio), a regional consortium corporation, has been established with the goal of advancing the region's sustainable growth via the promotion of innovation, knowledge, and attractiveness as well as the globalization of the territorial framework.

The main objective of this thesis is to continue and update the research done in 2019 from the collaboration between the Social Innovation Monitor and ART-ER, which examined and mapped the organizations supporting entrepreneurship in Emilia-Romagna in 2018. This thesis also aimed to provide a better understanding of the incubation landscape in Emilia-Romagna by communicating knowledge of the demographic features and the performances of incubators and incubated start-ups with reference to the year 2021. Parallel to the research, several differential analyses have been carried out comparing the outcomes to the case in 2019. These analyses gave important insights into how the industry has evolved throughout this time. Several studies were also conducted to understand the environmental differences between Emilia-Romagna and the other remaining Italian regions.

This paperwork is divided into three sections.

In the first chapter, the literature review is presented. Starting from the definition of entrepreneurial ecosystem, the role of incubators is defined. The latter are analyzed in detail, according to the different existing definitions and divisions. Finally, there is a section that focuses on the situation of incubators and accelerators in Italy and Emilia-Romagna, introducing then to what will be the focus of the work.

The second chapter, which is the methodology, details the technique used to prepare and perform the analysis.

Whereas the third chapter shows the analytical insight itself, presents the data and graphs that were discovered during the study and provides commentary on them.

The last chapter will include conclusions, summarizing the analysis's findings and stressing the study's limitations as well as the potential for more research in the area.

2. Literature analysis

2.1. Innovation and Entrepreneurial ecosystems

Intending to provide an analysis of organizations that support entrepreneurship in Emilia-Romagna, it is essential to start the discussion by offering a broad definition of what these organizations are and how they can support and incentivize entrepreneurship. Firstly, it's important to understand what an entrepreneurial ecosystem is and what the elements that compose it are.

The word ecosystem comes from the Greek " $0i\chi o \zeta$ ", meaning home, and " $\sigma v \sigma \tau \eta \mu \alpha$ ", meaning complex, and thus stands for a complex system where many entities coexist.

A biological ecosystem is a complicated web of connections between the local inhabitants, habitats, and living elements, that have the functional aim of keeping an equilibrium.

Similarly, an innovation ecosystem is a collection of connections made between various players with the primary purpose of fostering the advancement and innovation of technology (Deborah J. Jackson, 2011).

There are two main ways in order to produce more output within an economy, increase the number of inputs used in the production process or come up with new ideas to get the output without increasing the input. This last idea is the essence of Schumpeter¹'s concept of innovation, where innovation is defined as:

"the introduction of new or significantly improved products (goods or services), processes, organizational methods, and marketing methods in internal business practices or the marketplace".

(OECD, 2009)

Innovation is thought to be the main driver of substantial wealth creation in an economy, and, therefore, is important to favor the development of innovation ecosystems. When the resources invested in the research economy (either through private, public, or direct company investment) are then replenished by innovation-induced profit gains in the

¹ J. Schumpeter is a significant, if not seminal, player in the history of technical innovation. When discussing Schumpeter's role as a trailblazer in bringing innovation into economic studies, most economists who research technical innovation refer to him. Schumpeter defined innovation as any one of the subsequent five phenomena: Introduce a new product; introduce a new manufacturing process; open a new market; capture a new source of raw materials or partially finished goods; and introduce a new organizational structure (Godin, 2008).

commercial sector, the innovation ecosystem is said to be robust and healthy. The innovation ecosystem is considered to be expanding when, rather than being balanced, the growth in profits brought on by innovation exceeds the initial R&D investment (Deborah J. Jackson, 2011).

According to Moore² (1999), business growth depends on how relationally a company interacts with its stakeholders, particularly with suppliers, customers, and lenders. Accordingly, it is believed that new businesses established in dynamic ecosystems have a greater chance of expanding and generating employment than those established in other places that are not dynamic ecosystems. Like its biological equivalent, business ecosystems eventually transform from a haphazard collection of components to a more organized community.

Moore stated that every business ecosystem goes through four unique stages of development: birth, expansion, leadership, and self-renewal, or death if that stage is not achieved. The table below shows the cooperative and competitive challenges that each business passes through when developing an ecosystem (**Table 1**).

The Evolutionary Stages of a Business Ecosystem			
	Cooperative challenges	Competitive challenges	
Birth	Assemble a seed innovation's new value proposition with suppliers and customers.	Keep concepts hidden from those who might be defining similar offers. Secure crucial routes, and lead customers, and suppliers.	
Expansion	By collaborating with partners and suppliers to increase supply and achieve maximum market penetration, introduce the new offer to a sizable market.	Possible substitute applications of related concepts. By controlling important market niches, one can make sure that the strategy is the industry norm for that category.	
Leadership	Give a compelling future vision that motivates suppliers and customers to collaborate to keep improving the entire offer.	Maintain a powerful negotiating position with other participants in the ecosystem, such as important clients and dependable suppliers	

Table 1: The Evolutionary Stages of a Business Ecosystem (Moore, 1999)

² James F. Moore is considered the father of the business ecosystem and explains his reasoning in the seminal paper "Predators and Prey: A New Ecology of Competition," written for Harvard Business Review in the 1990s

	Collaborate with innovators to introduce fresh concepts to the current ecosystem.	Maintain high entry barriers to stop innovators from creating substitute ecosystems. In order
Self-Renewal		to purchase time to adopt new ideas into your own products
		and services, keep your consumer switching costs high.

2.1.1. Core elements of an Entrepreneurial Ecosystem

Close to the concept of the innovation ecosystem, there is the idea of the entrepreneurial ecosystem (EE). The EE is defined by scholars as a system whose core is composed of the so-called systematic conditions, that are, to name a few, networks of entrepreneurs, leadership, finance, talent, knowledge, and support services. These conditions interact with the framework conditions, which are which entail a social context that allows or limits human interaction (Cavallo, Ghezzi, & Balocco, 2019).

The ecosystem approach emphasizes that entrepreneurship develops and takes place within a community with different actors involved that exchange knowledge with each other, aiming to create new value. Ecosystems can exist at different spatial levels, from State to city or even university campus. Although ecosystems can be different, to be considered as such, an ecosystem needs to be characterized by the presence of universities and R&D organizations, together with strong business infrastructures and support facilities. Furthermore, there must be investment capital and public policies that incentivize venture creation, everything dipped in a strong entrepreneurial culture (Colombelli, Paolucci, & Ughetto, 2019). Numerous studies showed that incubators, accelerators, and other organizations are fundamental to setting up an entrepreneurial ecosystem.

Prof. Colin Mason and Dr. Ross Brown (2014) defined an entrepreneurial ecosystem as a collection of entrepreneurial actors, organizations (firms, VCs, business angels, and banks), institutions (universities, public sector agencies, financial bodies), and entrepreneurial processes.

Relying on Isenberg's model (2011) of an entrepreneurship ecosystem, an EE is composed of six different domains that interact with each other (see **Figure 1**). The domains refer to a favorable culture that enables growth-oriented policies, the availability of financing, quality, and skilled human capital, the presence of friendly markets open to innovative products, and a wide range of institutional supports. These six domains include

hundreds of elements that live around them and interact with each other in different ways, which can be random and complex, as the interactions among these variables do not depend on the law of cause-and-effect, and this explains there are no directional arrows in the figure. Therefore, it is not possible to replicate existing ecosystem models since they turn out to be a unique combination of elements.



Figure 1: Isenberg's model of an entrepreneurship ecosystem (Isenberg 2011; Mason and Brown 2014)

Referring once again to Prof. Colin Mason and Dr. Ross Brown's research (2014), Entrepreneurial ecosystems cannot emerge everywhere, but they typically develop in places with location-specific assets. There can be identified some distinguishing characteristics that contribute to and favor the birth of entrepreneurial ecosystems.

Distinguishing characteristics of an Entrepreneurial Ecosystem

The first, and most important, element for the formation of an EE is the presence of at least one (but usually many) well-established, sizable company. These affirmed businesses perform significant management functions, undertake R&D and production activities, and play an essential role in attracting talents, typically recent graduates, from outside. Some of these established companies may have been led by entrepreneurs and have become the so-called entrepreneurial blockbuster.

Moving on, an essential feature is entrepreneurial recycling, where successful and established entrepreneurs invest their time, money, and expertise in fostering new entrepreneurial activity.

Furthermore, it is fundamental to have an environment that is rich in information, where this information is both accessible and shared. In this context, Prof. Colin Mason and Dr. Ross Brown (2014) described the figure of deal-makers, seen as the main players in this information-sharing process. They are successful business people with the knowledge, contacts, and resources necessary to assist start-up businesses. They are able to assist these businesses in realizing their potential for growth by imparting their knowledge, information, and resources as well as making connections with the relevant people and organizations (such as clients, service suppliers, and talent). They could be business owners, financiers, or service providers.

In an entrepreneurial ecosystem's culture, the availability of start-up and growth capital, the presence of large companies, universities, and service providers, as well as other factors, are all crucial.

Silicon Valley is the most famous example of a geographically located ecosystem; Prof. Colin Mason and Dr. Ross Brown (2014) point out that Silicon Valley's economic success can be attributed to the establishment of a regional industrial system, the existence of universities focused on technological innovation and the existence of a culture that values networking over the traditional hierarchy of business functions.

2.1.2. Dynamic process of entrepreneurship

According to Aernoudt (2004), there could be identified a dynamic process of entrepreneurship, which can be exemplified in the following scheme (Figure 2).



Figure 2: Dynamic process of entrepreneurship (Aernoudt, 2004)

As can be seen from the figure (Figure 2), the presence and the work of an incubator, together with the Business Angels network, induce entrepreneurial activities to develop; at the same time, the interaction of Business Angels not only influences directly entrepreneurial activities but also indirectly, with projects embedded within the incubators. Moreover, a prosperous entrepreneurial context favors the birth and growth of new technology-based firms (NTBF), that, once developed, will encourage entrepreneurship; finally, the latter will lead more projects to incubators. This vicious circle represents the dynamics of entrepreneurship and can be stimulated by governmental policies.

In the following an analysis of the main organizations that encourage entrepreneurial ecosystem formation will be provided.

2.2. Definition of incubator

Incubators are considered a tool for entrepreneurship and startups, which is always more diffused.

The term incubator comes from the Latin *incubatio*, which represents the practice of lying down on fresh hide from newly sacrificed animals, in order to obtain advice from the Gods on how to overcome a disease.

Reflecting on this idea, business incubators take care of startups during their early phase, making them able to overcome initial obstacles. The American National Business Incubation Association³ (NBIA) provided the following definition of business incubators:

"Business incubators are facilities that provide shared resources for young businesses, such as office space, consultants, and personnel. They may also provide access to financing and technical support. For new businesses, these services provide a more protected environment in which to grow before they become self-sustaining." (Inc., 2020)

Incubators, therefore, turn out to be an organization that offers on one hand accommodation, and on the other services like business and legal consultancy and financial support. The services offered by incubators will be described more in detail in the following paragraph.

The ultimate goal of incubators is to produce valuable and durable businesses and hence, for an incubator to function well needs to have an adequate number of new enterprises with high growth potential, and good rotation rate, and a high survival rate of the businesses leaving the incubator; moreover, it's essential for the incubator to have strong links with industry, R&D centers, and universities, and lastly, a structure that can facilitate the access to financial markets (Aernoudt, 2004).

As will be discussed later on, incubators can be both public and private. Public incubators were the ones that first gained interest; they are facilities managed by institutional or public bodies with the purpose of fostering regional economic development, in particular,

³ Located in Athens, Ohio, the National Business Incubator Association is a privately owned nonprofit corporation. A 15-member board representing the top incubators in the nation leads the group. It is the top global organization promoting entrepreneurship and company incubation. It offers interested parties access to its network of contacts, information about incubators worldwide, training, guidance, resources, and expertise, as well as aid with starting and sustaining new firms ("InBIA: Global Network of Entrepreneurial Ecosystem Builders").

they support job creation and economic growth in a specific area, and they primarily make use of public resources. Their primary objective is to reduce startup expenses. The BLCs (Business Innovation Centers), which will be presented in the following, are the first and most well-known instances of public incubators in Europe (Abburrà, Grandi, and Grimaldi, 2003).

2.3. Services provided to supported organizations

As has been already presented incubators are a common instrument used to speed up the process of starting new businesses and lower the likelihood of failure. For the past two decades, many countries have looked to incubators as a means of promoting economic and technical advancement (Abburrà, Grandi, and Grimaldi, 2003).

Business incubators or accelerators provide a particular set of services to the supported startups, considering both the relevant incubation sector and the social economic backdrop of the reference region.

They integrate various amounts of physical infrastructure and tangible services and more intangible services, such as education and managerial support, to provide higher value-added.

Lalkaka (2000) defines technology-based enterprises as knowledge-intensive businesses that have some underlying characteristics. First, they need connections with universities and R&D centers. They also need networks with experts in financial restructuring, legislation, research, and specialized service providers. They may have proprietary knowhow that necessitates law and compliance. They have high financial requirements (and therefore potentially have greater risk) and, moreover, they need encouragement from local, state, and federal governments in the form of easier rules, financial incentives, and technical infrastructure.

Lalkaka (2000) defined the incubator for technological businesses (TBI) as a business incubator that aims to create enterprises with a broad focus on technology-based businesses, whose characteristics have been described before. The TBI essentially consists of a setting that offers physical space, shared facilities, counseling, training, and information tailored to specific technology ventures, as well as access to university research, finance, and technical support services in a convenient and affordable package. Such kindness and sharing have been demonstrated to facilitate business start-ups by lowering start-up expenses and delays, as well as lowering the likelihood that a nascent business will fail (Lalkaka, 2000).

A TBI, as exhibited in the figure below (**Figure 3**), should offer infrastructure support, technology support, and managerial support. The TBI's features should include a careful selection of potential entrepreneur-tenants, help with business planning and obtaining seed money, training in small business management, and, after a reasonable incubation period, the successful businesses should leave the incubator, opening up space for new tenants.



Figure 3: Technology based incubator, the interplay between innovation and business assistance (Lalkaka, 2000)

The services typically offered by incubators are:

- Managerial support: incubators can help new businesses with the drafting of the business plan, and can provide professional services such as accounting, legal and tax support, recruitment of new staff, and strategic support. They can also provide management support, helping entrepreneurs develop the necessary management skills (in practice, however, many incubators do not offer start-ups these kinds of skills, which, generally, are sought by entrepreneurs from outside consulting firms) (von Zedtwitz and Grimaldi, 2006; infoDev, 2016).
- Physical spaces and shared services: incubators provide new businesses with office space, premises, furniture, infrastructure, Internet, and computer labs.

Incubators compete with Science and Technology Parks and, occasionally, real estate firms for the availability of physical resources (Abburrà, Grandi, and Grimaldi, 2003).

- Entrepreneurial and managerial education: in addition to overall good business judgment, critical success factors for any startup or new business survival are financial, marketing, and management skills. Incubators, therefore, need to work to improve these skills in their tenants. It is crucial that those who manage incubator organizations adopt the mindset of an entrepreneur and offer the necessary training to the tenants. Inside the incubator, essential is the figure of the mentor, an experienced incubator manager that provides advice and guidance during the start-up's development. Hence, the mentor offers the supported organizations entrepreneurial and managerial education; he/she can also facilitate the creation of a network for the new entrepreneurs (Abburrà, Grandi, and Grimaldi, 2003).
- Access to finance: incubators provide access to various sources of finance, either through their own funds or through funds created with contributions from outside investors; this is valid, especially for the private ones. Depending on the growth stage of the business, the incubator may link its client with government grant schemes, banks, or venture capitalists (infoDev, 2016).

The tenants of incubators are new businesses that require funds for investment in the very early stages of start-up, the seed capital. To be more precise the type of financing may vary from seed grants to credit, to equity (infoDev, 2016). The main competitors in funding activity are Business Angels, venture capitalists specializing in providing seed capital, and investment companies (Abburrà, Grandi, and Grimaldi, 2003).

• Administrative and legal services: incubators, among other services, also offer secretarial assistance, reception, mail, IT support, and legal support. These organizational and administrative services are not complex or technologically advanced, but still, they are fundamental skills that incubators must provide, since they enable aspiring entrepreneurs to save time and money, especially in the initial stages of their business and to start their business faster (Abburrà, Grandi, and Grimaldi, 2003).

The facilitation of knowledge of procedures connected to compliance with rules and regulations at the regional, national, and international levels emerges as one of the primary goals of this typology of services (infoDev, 2016).

- Intellectual Property (IP) management support: it is crucial to safeguard intellectual property rights originating from the development of novel goods or services in industries with high rates of innovation and technology. On the legal side, the services that an incubator needs to provide are the ones aiming to facilitate know-how licensing agreements, patent reviews, intellectual property protection, and non-disclosure procedures. Most of this specialized work is based on referrals (Lalkaka, 2000).
- Networking: incubators facilitate relationships between the startup company management team and external experts from the relevant sector or industry, the so-called mentors. They also set up a network with experienced people inside the incubator management team itself. In this way, incubators help to build the individual entrepreneurial and business skills of each client. Networking aptitude refers to the ability of incubators to stimulate collaborations among newly established firms, in order to facilitate knowledge transfer, the establishment of technological and market partnerships, and learning processes. Aspiring entrepreneurs usually do not have the networks of relationships that incubators have at their disposal. Access to these strategic networks is usually provided by consulting firms, business angels, or networking organizations.

Furthermore, incubators facilitate interactions between their clients and industry leaders relevant to their clients' markets. These networks and contacts can help the client companies recruit new customers or enter new markets, identify potential partners and reach potential investors.

Networking is surely one of the most important services offered by an incubator since part of the reasons why a start-up chooses to join a specific incubation program is to be found in the expected synergies that arise from cooperation and learning with complementary startups present within the incubator or with external actors, which are part of the incubator's network (von Zedtwitz and Ruping, 2001; Abburrà, Grandi, and Grimaldi, 2003).

• Technology development and scouting support: Incubators provide technical assistance to entrepreneurs working in the scientific and technology domains, such as with technology transfer and the commercialization of novel ideas through

new goods or services. Between the other support services, the incubator must provide technological and scouting assistance (Smilor, 1987).

- Social impact measurement services: It represents the measurement of the advantages and well-being brought to society by the business.
- Training/consulting on business ethics and CSR: in recent years the growing community awareness of social and environmental issues has helped to develop concepts such as CSR⁴, and business ethics and to fuel the growth of social entrepreneurship.

Social entrepreneurship aims at creating businesses that adopt as a mission the willingness to create and sustain social value (rather than just private value), and pursue new opportunities to serve that mission, engaging in a process of continuous innovation, adaptation, and learning. These businesses display increased accountability to the constituencies served and for the outcomes (Dees, 2018).

Therefore, an innovative process was applied to address social difficulties. As a result, incubators started to provide specific assistance in these areas, which is now necessary for many industries to compete successfully in the market (Baldassarre, Giordano, Michelini, Perrini, 2015).

2.4. Sources of income and costs for incubators

In terms of revenue sources, incubators offer a wide range of options, much like in the case of services. Some of these options include:

- Income coming from rentals of physical spaces;
- Revenues from the provision of services to entrepreneurial teams and support organizations;
- Income from investment in the supported enterprises (e.g., from having equity dividends or from selling equity exit);
- Grants, funding, and co-funding from local, national, and international calls for proposals;

⁴ Corporate social responsibility (CSR) is a self-policing corporate strategy that enables an organization to be socially accountable to its customers, employees, and stakeholders. When a firm practices corporate social responsibility (CSR), it means that it operates in a way that benefits society and the environment rather than detracting from it (Fernando, 2022).

- Donation;
- Other revenues, such as revenues related to management activities of a science park; fee-based activities of scouting, and open innovation for companies.

Contrarily, incubators endure a combination of the following expenses in terms of costs:

- Facility management costs and generic services;
- Entrepreneurial and technical support services: such as legal, administrative, or accounting;
- Training;
- Other services.

2.5. Incubators typologies

Originally, an incubator was an instrument to encourage regional economic development and revitalization of declining areas through the promotion of the birth of technologybased firms (Aernoudt, 2004). Nowadays, since the number of incubators is growing, the term is becoming more and more an umbrella concept, which can assume different meanings and entail different aspects, and therefore, there is a great need to define different typologies according to their objectives. The existence of incubators is justified since they lead to high innovation performances, but still, it is important to analyze the outcomes according to the type of innovator. The first relevant research regarding incubator classification has been conducted by Allen and McCluskey (Allen and Mccluskey, 1991), who distinguished the typologies of innovators looking if the value was added through real estate or through enterprise development programs; they identified six types of incubators for-profit property development, not-for-profit development corporation, academic, for-profit seed capital, hybrid and corporate (Barbero et al., 2012).

This was to mention one, but scholars developed a various number of other taxonomies of incubators, considering different aspects.

Relying on the study of Von Zedtwidtz and Grimaldi (2006) incubators in Italy could be categorized according to Porter's four competitive scope factors (vertical scope, sector scope, regional focus, and industry focus) and the strategic purpose (for-profit, not-for-

profit). The five types of incubators that arose from their work were: regional business, university, virtual, independent commercial, and firm internal. Regional businesses and universities are not-for-profit entities, in contrast to independent businesses and corporate internals. The for-profit nature, lack of physical location, and preference for online services define the virtual type. The independent commercial type relies on private money, invests in high-tech industries, is situated in industrialized areas, and is run by passionate individuals.

Internal business entities fund and host ventures with a parent company connection at their core (Barbero et al, 2012).

As concerns the analysis of this research work, which will be discussed in the following chapters, the first important division between the incubators must be made considering the legal nature of the incubators. Following the reasoning of Grimaldi and Grandi (2005), incubators can have a public or private nature. Furthermore, according to what has been stated in the Social Innovator Monitor (SIM)⁵ report (SIM report, 2021), one more typology of incubators can be considered, the public-private.

2.5.1. Public Incubators

Public incubators are organizations managed by public administrations. These types of organizations work to boost technological and economic development; their main source of profit is the fees they charge for the services they provide and public funds.

Grimaldi & Grandi (2005) identified two typologies of public incubators: Business Innovation Centers (BICs) and Universities Business Incubators (UBIs).

Their objective is to encourage entrepreneurial initiative, with medium to long-term direction.⁶

BICs and UBIs are non-profit organizations that were established by governmental bodies to assist regional development and therefore they differ from private incubators (Corporate Private Incubators - CPIs - and Independent Private Incubators - IPIs.) which were founded by private persons or organizations with the intention of making a profit, and that will be discussed later.

⁵ The Social Innovation monitor (SIM) is a team composed of researchers and professors from different universities united by an interest in innovation and entrepreneurship with significant social or environmental impact. The team is coordinated by Prof. Paolo Landoni of the Polytechnic of Turin.

⁶ Medium/long-term direction refers to the average incubation period and thus the time it takes for a business to become independent.

Business Innovation Centers

Business Innovation Centers (BICs) were the first typology of public incubators to appear, emerging in Europe in 1984 through the DG XVI, from the European Commission's willingness to revitalize depressed European regions. Their incubation activity consists of the provision of logistic, technological, and other business services, including space, infrastructures, and communication channels.

With the aim of boosting the recovery of declining regions through the development of innovative technological ventures, among BICs another important measure was the creation of science parks (SPs).

SPs and BICs have similar objectives and their main differences stay in the fact that, first, BICs place less emphasis on innovation and science-based activities while paying substantially more attention to the emergence of new businesses in low-tech industries. Second, compared to an SP, the connection to academic and research institutions is typically weaker. In order to emulate earlier US success stories, where the first parks built in the 1950s were the Research Triangle Park in North Carolina and the Stanford Research Park surrounding Stanford University, European parks were frequently created through collaborations between national and local governmental organizations, commercial businesses, and local universities.

Nevertheless, some writers question the usefulness of parks and it still seems uncertain whether parks have been successful in sustaining NTBFs despite their widespread use throughout Europe. Despite these claims, a study by Colombo and De Mastro (2002) has shown that, as stated in previous research the R&D intensity of businesses based in incubators is comparable to that of businesses based outside of incubators and that the former businesses had only marginally more inventive output than the latter. However, this work also suggested that incubated enterprises benefit from having a more educated staff, a much higher likelihood of adopting technical breakthroughs, a higher aptitude for taking part in worldwide collaborative R&D initiatives, and access to research center output. This demonstrates a favorable direct and/or indirect effect of the on-incubator position. The staff of SPs and BICs offers practical technology brokerage services that enable NTBFs to better utilize their internal knowledge resources.

Universities Business Incubators

Universities Business Incubators (UBIs) are institutions set up by universities that have the willingness to take on an active role in entrepreneurial development and spread scientific and technological roles. They are in many ways similar to BICs but with a greater emphasis on transferring scientific and technological knowledge from universities to companies. It goes without saying that universities' primary role is education, but nevertheless, their contribution to R&D, leading also to patentable discoveries, can be substantial for economic growth. In fact, UBIs offer typical incubator services together with university-related services, such as library services, labs and equipment, R&D activity, and technology transfer programs. (Grimaldi and Grandi, 2005)

The potential university incubators hold for combining technology, capital, and knowhow, for inspiring new entrepreneurial talent, and for accelerating the commercialization of research products through the support of knowledge-based businesses and operating in high-tech sectors are what have sparked interest in them. (Abburrà, Grandi, and Grimaldi, 2003)

According to Mian (1996), UBIs primarily offer two types of services; first, common incubator services that include access to capital, business networks, shared office space, and rent reductions. Second, university-related services include faculty consultants, student employees, university image promotion, library services, labs/workshops and equipment, mainframe computers, related R&D activity, technology transfer programs, employee education and training, and other social activities.

The most well-known UBIs cases in Europe are The University of Twente in Holland, which has made it possible for more than 300 new businesses to be incubated through its TOP (Temporary Entrepreneurial Placements) Program; Cambridge University in the UK where, since 1978, 1.5 businesses have been founded on average each month, with a 93% five-year survival rate.

Looking at the Italian context, in terms of UBIs, the examples of the Turin Polytechnic incubator and the University of Bologna's incubator demonstrate their effectiveness in knowledge transfer and in forging official, fruitful relationships with institutions. Of particular importance is the Turin Polytechnic incubator (I3P, Incubatore Imprese Innovative del Politecnico), that was the first university incubator in Italy. It was established in June 1999 at the initiative of the Politecnico di Torino, the Province of Turin, the Chamber of Commerce, and FinPiemonte.

Anyway, both for the case of Torino and Bologna their ability to act as intermediaries between fresh endeavors and sources of scientific and technological information is what gives them value. The study by Grimaldi and Grandi (2005) demonstrates how UBIs can benefit new ventures through the network of contacts made available to them through the incubator; through the visibility and reputation gained through affiliation with a leading research institution; through access to academic facilities and laboratories; and through access to specialized academic knowledge. The same work also highlighted that one of UBIs' major drawbacks is their inability to provide money, management/economic expertise, and ongoing operational support. Indeed, the services that UBIs offer to their tenants mostly depend on the incubating management team, its skills, and on partnerships, it cultivates for the incubating organization.

Considering once again AlmaCube, the University of Bologna's incubator, the management staff is also involved in other entrepreneurship-supporting programs, thus there is a strong and well-established network of relationships with business partners, business angels, and bank foundations; this means that there are more opportunities to access company management skills and finance.

2.5.2. Private Incubators

Private incubators are organizations managed completely by private entities, both profit or fee/equity-oriented. There are many ways by which private incubators can make money, such as charging service fees or taking a percentage of revenues from incubated companies.

The establishment of private incubators must be sought as a consequence of the IT revolution in the second half of the 1990s, which led the incubation industry to change. In fact, there was a need to speed up the time to market, to have quick access to capital, and synergies, networking, and strategic cohesiveness became the basic key to succeeding.

The purpose of a private incubator is to create new ventures quickly, getting in exchange a portion of the equity of the new ventures created as a fee. They offer opportunities to take on specialized business advice, infrastructure, and relationships network with strategic players. Finally, it saves the time the startup takes to prepare for a trade sale or IPO. Hansen, Norhia e Chapman (2000) led an analysis to investigate profit-oriented private incubators in the United States. Despite the analysis being somewhat out of date currently, significant insight can still be found. They found that the majority of incubators are located in California (31%), followed by New York (15%). The incubation time is typically nine months and the average incubation period for incubators that invest in early-stage enterprises (early stage) is 9.2 months, compared to 7 months for incubators that invest in the invest in established businesses (middle or late stage) (Abburrà, Grandi, and Grimaldi, 2003).

The position of European incubators differs from that in the United States, according to a June 2001 research by the Business Incubator Association Europe (BIA Europe) (Abburrà, Grandi, and Grimaldi, 2003), mostly because European nations have less developed venture capital systems than the United States. The United Kingdom has the most incubation activity in Europe, and the majority of incubators are in London. The majority of U.K. incubators operate globally, have the largest business portfolios in Europe, and have multiple U.S. incubator subsidiaries among them. (Abburrà, Grandi, and Grimaldi, 2003)

Grimaldi & Grandi identified two typologies of private incubators: Independent Private Incubators (IPIs) and Corporate Private Incubators (CPIs) (Grimaldi and Grandi 2005). Both CPIs and IPIs offer services that aim at the provision of finance and intangible and high-value assets, with a short-term time horizon.⁷

Corporate Private Incubators

Corporate Private Incubators (CPIs) are incubators owned and managed by big companies; large corporations use CPIs to pursue a diversification strategy, supporting the emergence of new business units. These incubators play an important role during the business concept definition of a new enterprise, therefore during the early stage of the business development cycle (Grimaldi and Grandi, 2005).

Becker and Gassmann (2006) present a taxonomy of corporate incubator types, where, relying on the sort of technology (core/noncore), the authors classify corporate incubators in technology businesses into four categories: these categories being, fast-profit,

⁷ It is reasonable to assume that companies sponsored by for-profit incubators will achieve independence sooner than companies founded by public corporations; that's because private incubator management teams have the incentive to sell their invested companies as quickly as possible and expect cash.

leveraging, and in-sourcing. Higher survival rates and adoption of parent core technology obtained outside are two characteristics of insourcing incubators (Barbero et al., 2012). Although most businesses recognize the value of innovation, they frequently find it difficult to implement. Companies face the challenge to decide whether to expand into new markets or keep growing their current operations and many businesses fail to take on innovative prospects in new industries while juggling their daily difficulties and operations (Christensen,1997; Christensen and Raynor, 2003). Organizations should blend exploitation with exploration, becoming "ambidextrous", according to Tushman and O'Reilly III (1996), rather than prioritizing one over the other. Well-established businesses have started to set up internal incubation systems to encourage workers and outsiders to investigate and develop hazardous business possibilities with the aim of creating radical innovations while pursuing incremental benefits (O'Reilly III and Tushman, 2004). Thus, it is believed that corporate incubators are the best approach to developing new competencies or business concepts.

Academics claim that one of the most important features of corporate incubators is their ability to monitor each step of developing and promoting a unique product or service or business strategy (Garrett and Covin, 2013; Gonthier and Chirita, 2019). Also, they are crucial in fostering organizational learning in IPCs (Keil, Gunther McGrath, and Tukiainen, 2009; Gonthier and Chirita, 2019).

Looking at the literature, it's been demonstrated that corporate incubation is a powerful tool that can help a company's employees develop an entrepreneurial attitude, in addition to being a practical approach for existing businesses to explore new ideas for their business innovation initiatives. The company's ability to innovate will ultimately develop as a result of the entrepreneurial spirit that is taught to its personnel (Gonthier and Chirita, 2019).

Independent Private Incubators

Independent private Incubators (IPIs) are incubators managed by single individuals who want to boost and incentivize the entrepreneurial ecosystem, creating new businesses and making them grow. Occasionally, also companies can be partners in the IPIs. The investors put their own money in the incubator and hold an equity stake in the new companies that develop. An IPI's institutional strategy is therefore to create profit. According to BIB, private incubators add value through corporate expansion and private finance. As previously stated, private incubators are businesses with a financial motive, and one of their goals is to adopt an information flow that is organized professionally. in order to make money from managing projects. Private incubators frequently offer access to finance and high-value intangible assets like management expertise, QSEs, and outside partners, which can result in a streamlined marketing process and the desired corporate return on investment (Pattanasak et al., 2022). According to Aernoudt (Aernoudt 2004), incubation differs in each European nation, but he also notes how similar countries share some incubation characteristics. Anglo-Saxon, German, and Latin are the three regions mentioned by the author.

The IPIs sometimes are called accelerators and are considered distinguished from proper incubators. Scholars do not agree unanimously on the actual difference between incubators and accelerators, and this topic will be analyzed further (Grimaldi and Grandi, 2005).

IPIs are principally focused on the supply of intangible services, such as the transfer of competencies and knowledge-based services, and this aspect makes them clearly different from UBIs, which typically contain mainly tangible services. However, they share with the BICs the idea of being more likely to be outward-looking in their hunt for fresh business ideas to incubate, since they are not connected to a particular university or business (Grimaldi and Grandi, 2005).

Two Incubating Models

Grimaldi and Grandi (2005) in their study, arrived at the definition of the two incubating models, and the graphical representation can be seen in the figure below.



Figure 4: Two incubating models (Grimaldi and Grandi, 2005)

The public BICs, whose services are primarily focused on the provision of tangible assets and market commodities, is located at the edge of Model 1; as it's been explained before their main goal is to provide physical assets and eventually lead to external sources of finance technical and managerial support, through a network made by public entities.

In the years since the Internet boom, there has been a steady rise in high-tech and knowledge-based businesses, which are distinguished by quick and drastically changed business models. Access to cash, intangible assets, knowledge, and speed to market are now crucial for these businesses. As a result, incubators have modified their business models to meet the needs of businesses and are now providing more direct access to funding. This is unquestionably a key aspect of the incubators of Model 2. Moreover, another essential characteristic of these incubators is their propensity to network; this attitude refers specifically to the capacity to connect young businesses in functional connection with other economic actors within or connected to the incubator itself and therefore encourage partnerships between start-up teams, rather than as the formation of relationships with external institutional actors (Abburrà, Grandi, and Grimaldi, 2003).

This facilitates the exchange of talent and knowledge between businesses, the development of marketing and technological relationships, and the mutual learning processes between them.

Following this reasoning, UBIs may be positioned somewhere in the middle of the two concepts. Since they rely on incubate's fees and public subsidies, their incubation model is comparable to that of BICs. However, their main goal is to give knowledge-based businesses ongoing access to cutting-edge technology information, academic infrastructures (labs and facilities), and academic networking. This aspect makes them differ from Model 1 incubators and more akin to Model 2 incubators.

The ability to provide access to intangible, high-value-added resources and services through networking is what can be thought to be the distinguishing characteristic of private incubators in general, and it is feasible to discern this characteristic within these four categories of incubators. More specifically, the network of contacts and strategic alliances built up around the incubator enables businesses to obtain managerial and technological know-how, forge alliances with incubator partners, increase visibility, and, ultimately, shorten time to market.

Private-Public Incubators

Private-public incubators are organizations whose corporate structure has both private and public entities.

2.5.3. Business, Social and Mixed Incubators

Again, considering the analysis that will be discussed in the following, it's necessary to introduce another distinction between the incubators; this time, on the basis of the typology of services they offer or the mission they have, there can be business, mixed or social incubators.

Business Incubators

A business incubator is defined, according to OECD 1997⁸, as a

"propriety-based venture which provides tangible and intangible services to new technology-based firms, entrepreneurs, and spin-offs of universities and large firms, all with the aim of helping them increase their chances of survival and generate wealth and jobs and diffuse technology."

(OECD, 1997)

Always according to what has been claimed by OECD (1997) technology incubators, and business incubators interested in the development of NTBFs, have four main objectives:

- 1) Economic development
- 2) Technology commercialization
- 3) Property venture/real estate development
- 4) Entrepreneurship

Business incubators help their tenants to survive in the early stage of their development, providing them with physical facilities and various business services.

As just stated, business incubators are completely focused on technological progress; they are not interested in supporting startups that with their work want to bring positive social changes.

⁸ The Organization for Economic Co-operation and Development (OECD) is an international organization, that works together with governments, policymakers, and citizens, to establish evidence-based international standards and find solutions to a range of social, economic, and environmental challenges ("OECD.Org - OECD", 2022)

Social Incubators

Social Incubators can be defined as incubators that more than 50% of startups they support have as a mission the introduction of positive social impact and, therefore, they give great importance to services linked to social impact (e.g., social impact measurement) (Sansone et al., 2020).

Sansone et al. performed an analysis on Italian incubators with the aim of understating and analyzing the effects of the various types of incubators (Business, Mixed, and Social) on tenants' growth in order to determine whether social incubators are distinct from the other types of incubators. The researchers analyzed the importance of ten services that incubators provide. These services were: managerial support; physical spaces and shared services; entrepreneurial and managerial education; access to finance; administrative and legal services; Intellectual Property (IP) management support; networking; technology development and scouting support; social impact measurement services; training/consulting on business ethics and CSR. These services are intended to improve the human capital resources⁹ of the supported start-ups, including their knowledge, information, ideas, skills, and general health. The analysis showed that, unsurprisingly, Social Incubators, unlike other typologies, put great importance on social measurement services. Apart from that, Sansone et al. showed that Social Incubators, although they consider tenants interested not only in economic performances but also in bringing a positive social contribution, are efficient as the other incubators.

Mixed Incubators

Mixed Incubators are incubators that support both startups with a positive social mission and more traditional ones. Between their tenants there can be found from 1% up to 50% of startups that have the mission of bringing a positive social impact.

Referring once again the study of Sansone et al. (Sansone et al., 2020), it resulted that Mixed Incubators put great importance on managerial support and entrepreneurial and managerial education services. This would suggest that these kinds of incubators give more thought to training for human capital.

⁹ The study of human resources is known as human capital theory. It discusses how our society's functioning influences how economic value develops. By putting more emphasis on education and training, people can increase their production and efficiency (Kenton, 2022).

2.6. Accelerators

When describing the entrepreneurial ecosystem and the organizations that spur entrepreneurship and innovation it's necessary to talk about accelerators since scholars do not agree unanimously on whether they should be considered as a new generation of incubation model.

Notably, when incubators first appeared, many cutting-edge technology firms were engaged in activities in capital-intensive industries including electrical equipment, microelectronics, and biotechnology. But as the digital economy has grown and technology has advanced, the environment in which many entrepreneurs operate has changed, since it now takes much less capital and time to launch a new product or service. A new incubation model was developed to help these new digital ventures early in their lifecycle: accelerators (Van Hove, 2018). It is regarded as the most recent generation of incubators, where helping businesses succeed as entrepreneurs take precedence over simply providing space. Accelerators are essentially leading-edge investment vehicles and business service providers that identify and support promising entrepreneurial teams with time-limited pre-seed funding, formal education, and rigorous mentoring. It basically attempts to improve overall venture performance and quickly increase its investment possibilities using the lean startup methodology.

In other words, startup accelerators are a phenomenon of the digital economy and are structured around the pursuit of new technology initiatives and the identification of entrepreneurial opportunities, with the majority of them selling software and internet services (Van Hove, 2018).

The organization that is considered the first accelerator is called Y Combinador and was established in Massachusetts in 2005, rapidly influencing the emersion of others.

Accelerators are organizations that, similarly to incubators, aim at helping new enterprises offering specific services.

Some scholars (Pauwels et al., 2015) claim that despite the similarities with incubators, accelerators have some characterizing aspects, that will be analyzed in the following. To start, accelerators aim at providing assistance with a particular focus on intangible services, such as mentoring and networking, for a limited period of time. Accelerators are not designed to offer physical resources (e.g., offices) for a long period of time, but the time duration is an average of 3-6 months, and the model is focused primarily on intense interaction and education to endure rapid progress. One more important feature of an

accelerator concerns the relationship with its alumni; in fact, there is a great focus on alumni network and post programs support. Furthermore, startup accelerators are mainly for-profit organizations that typically offer pre-seed investments in exchange for equity (Pauwels et al., 2015).

Nevertheless, scholars do not seem to agree on the matter; some (SIM report, 2021) argue that since accelerators and incubators have the same goal of boosting entrepreneurial devolvement, they must be considered similar institutions and there's no need to define an actual difference.

Due to the fact that there are no shared and unambiguous definitions, in the analysis chapters, the term incubator will be used to indicate both incubators and accelerators.

2.7. Open innovation

The model of Open Innovation has been first coined by Henry Chesbrough in his book "The New Imperative for Creating and Profiting from Technology"; Chesbrough originally defined OI as

"a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open Innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model". (Henry William Chesbrough, 2003)

Later on, Chesbrough modified the definition, saying:

"Open Innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively". (H. Chesbrough, Vanhaverbeke, and West, 2006)

Open Innovation is defined as.

Despite the many definitions that can be found in literature of Open Innovation, the SIM team to define the survey that will be discussed in the following, relies on the definition of 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" (Gassmann et al., 2010).

Closed innovation dominated the research and development of the majority of industrial firms for the most part of the 20th century. In the new open innovation model, the company commercializes its own ideas as well as the innovations of other companies and looks for ways to bring its ideas to the market, using ways outside of the current business operations (Henry W Chesbrough, 2003).

The figure (Figure 5) below represents the open and closed innovation process.



Figure 5: Closed and Open Innovations Model

The funnel is a metaphorical illustration that greatly aids in comprehending the fundamental idea of open innovation. The flow of ideas from a variety of sources into a single, actual market proposal while passing through a number of decisional nodes is sometimes depicted using "funnel charts." As exhibited in figure (**Figure 5**), the open innovation paradigm includes a variety of actions that both push internal ideas outside the
corporate boundaries to new markets and pull internal ideas from external partners inside. Open innovation is an ongoing model in which various companies embrace various interactions with outside parties for their type and intensity. Each of those interactions can, in fact, vary in how open they are, allowing each firm's innovation model to be positioned between two extremes of closed and open innovation. The definition of dynamic capabilities given by scholars is:

"The firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments." (Teece, Pisano, and Shuen, 1997; Teece, 2007)

The three capacities to adapt, absorb, and innovate make up a firm's dynamic capabilities, according to Wang and Ahmed (Wang and Ahmed, 2007). By combining an innovative strategic perspective with innovative processes and behaviors, an organization's innovation capability refers to the skills and knowledge it uses to create new goods or markets. In a study by Gonthier and Chirita (2019), the scholars utilizing the resources, processes, and values (RPV) theoretical framework developed by Christensen et al. (2004) and considering that the RPV framework can be used to explain why established firms find it difficult to adapt to disruptive technologies, they addressed how incubators can develop an entrepreneurial mindset that drives innovation. According to the study, large, well-established firms must be able to take risks and venture into uncharted territory in order to succeed over the long term. They must also be able to maximize their current capabilities and increase efficiency. Established businesses are increasingly depending on corporate incubators to foster innovation and growth with an entrepreneurial mindset in order to tackle this challenge (Gonthier and Chirita, 2019).

2.7.1. Entrepreneurship in an open environment

The open innovation paradigm set up by Chesbrough showed the importance to use both internal and external knowledge to arrive at an effective innovation result; opening up the innovation process is fundamental for innovative startups. The main reasons behind the importance of external collaboration in supporting the innovative performance of firms are, firstly, that expanding the knowledge base accessible to enterprises can increase the number of possible knowledge constructs, considering that radical and incremental

innovation arises from novel combinations of existing knowledge. Secondly, exposure to new technologies and practices can increase the absorptive capacity of companies (Del Sarto, Cruz Cazares, and Di Minin, 2022).

Startups at the very start of their life cycle face constraints because of newness and smallness, therefore they could overcome these limits through the open environment offered by incubators, gaining new knowledge and compensating for their weaknesses (Del Sarto, Cruz Cazares, and Di Minin, 2022).

Del Sarto et al. (2022) identified three main sources of external knowledge to which a startup is exposed during the incubation process and from which it can learn: *peers*, *mentors*, and *investors*.

Startups in incubation programs are exposed to other *peers* since the incubator environment makes tenants in close contact with their peers.

Mentors are at the core of the existence of incubators, they are one of the fundamental components of the value offered by these organizations; the presence of mentors makes the overall success rate of startups increase.

Investors boost the likelihood that a business will survive because they offer broader and deeper expertise, experience, and resources.

Del Sarto et al. (2022) examined the effects of peers, mentors, and investors' sources of knowledge on radical and incremental innovation¹⁰ performance using the Open Innovation perspective.

The scholars found out that leveraging *peers* as a source of outside expertise has a positive impact on startups as concerns *incremental innovation*. In fact, throughout the incubation program, other startups accelerated in the same cohorts are viewed as a reliable source of outside tacit and explicit knowledge that expands the startup's knowledge base and improves their incremental innovation performance (Del Sarto, Cruz Cazares, and Di Minin, 2022). However, the information offered by other companies does not appear to positively impact radical innovation performance.

As concerns the use of *mentors* as a source of external knowledge, it seems to be positive for *incremental innovation* and does not affect *radical innovation*.

Finally, *investors* look to be beneficial for *incremental* and *radical innovation*.

¹⁰ Incremental innovation comes form from adapting, repurposing, merging, and utilizing previously learned knowledge. Radical innovation entails the creation of fundamentally new knowledge, a fraction of turnover related to products new to the world that usually comes after a disruptive scientific discovery (Del Sarto, Cruz Cazares, and Di Minin, 2022).

Investors provide, in addition to investments, also consultancy and spread their knowledge. Venture Capitals and business angels connected to an incubator's network are highly specialized in a particular technological field and, therefore, successful at passing on knowledge to startup teams.

To conclude, the research showed that in general the use of external knowledge in incubation programs, and therefore embracing the open innovation point of view, increases startups' innovation performance.

According to Battistella et al. (2017), accelerators, and incubators act as a middle layer between young businesses and outside sources of information and resources that aid in their development. Relying on Chesbrough's theory (2003), the open innovation paradigm is built on opening up the innovation process to outside sources (Battistella, De Toni, and Pessot, 2017). Startups' newness and small size may imply the lack of specialized responsibilities and skills and the absence of resources (mostly human and financial) to organize the innovation process. This situation poses serious challenges to both the startups and the connected intermediary entities (accelerators, incubators, policy systems, etc.). By creating knowledge and capabilities, and forming new connections, an open innovation method (Henry William Chesbrough, 2003) can alleviate many of these issues, indirectly affecting the likelihood that the new enterprise will survive. Starting from this idea, Battistella et al. (Battistella, De Toni, and Pessot, 2017) conducted an analysis to examine the effectiveness of accelerators from an open innovation approach.

The scholars found out that after completing the accelerator program, the start-ups had developed their own network of knowledge and experience from many fields, even from various industries. They arrive at the formulation of a proposition that claims that open innovation techniques are used to address specific potential reasons for failure in start-ups enrolled in accelerator programs, particularly those relating to the qualities of the product or service, target market/needs awareness, strategic focus, and relative managerial and industry-specific know-how (Battistella, De Toni, and Pessot, 2017). They highlighted the crucial role that incubators and accelerator programs play in enhancing open innovation processes for start-ups since it improves the possibility of overcoming internal skills gaps in the market, strategy, and industry.

2.8. Landscape in Italy

2.8.1. SIM and ART-ER

The analysis that will be provided in the following chapter has been obtained from the collaboration of the SIM team and ART-ER.

The Social Innovation Monitor (SIM) is made up of a group of academics and researchers from various universities and worldwide research. SIM members share a passion for innovation and entrepreneurship, with a particular emphasis on social or environmental effects. The Politecnico di Torino's Department of Management and Production Engineering (DIGEP) serves as the operational hub for SIM.

Paolo Landoni, a professor of entrepreneurship and innovation at Politecnico di Torino, serves as the team's coordinator.

Emilia- Romagna's consortium corporation, ART-ER (Attrattività Ricerca Territorio), has been established with the goal of promoting the region's sustainable growth via the promotion of innovation, knowledge, and attractiveness as well as the globalization of the territorial framework. ART-ER uses a variety of approaches that have been successful in the Emilia-Romagna area to aid in the genesis of new knowledge-intensive entrepreneurial endeavors ("ART-ER | EmiliaRomagnaStartUp").

2.8.2. The Italian landscape

In Italy, the first incubators were established in the 1980s as an initiative of the public sector, that made an effort to encourage entrepreneurship and economic growth, particularly in the most economically depressed regions of the nation.

A key contributor to the development of the first business incubators, known as Business and Innovation Centers (BICs), which, as already explained before (see section 1.5.1 Public Incubators), were based on the model put forth by the European Commission, was the public-natured Society for Entrepreneurial Promotion and Development (SPI). These centers were primarily focused on high-tech manufacturing sectors.

Parallel to this, Science and Technology Parks (STPs), also carried out mostly with public funds, started putting incubation channels into place in the late 1980s to assist the emergence and growth of creative businesses.

When it came to the promotion of incubation programs, Italy lagged behind the rest of Europe. In particular, the Area science park of Trieste, the first scientific park, was constructed in 1982. However, their dissemination was poor—just consider that they only

recorded 4 constructions in 1990. They began to increase in quantity about 1990, and by 1995, 12 SPs were estimated to be part of the Italian scene. Public financing efforts supported the development of BICs and SPs (Auricchio et al., 2014).

In recent years, Auricchio et al. (2014) conducted the first attempt at mapping the Italian environment with reference to incubation activities; the academics based their work on a survey on business incubators in Italy, conducted between September and December 2012 by the Turin office of the Bank of Italy, in collaboration with the PNI Cube Association and the I3P Incubator of the Polytechnic of Turin.

The first element to emerge from the study was a certain geographical fragmentation of the incubators surveyed; of the 58 entities that collaborated in the survey, 10 are based in the Northwest, 18 in the Northeast (including 9 in Emilia Romagna), 17 in the Center (including ten in Tuscany) and 13 in the South. Furthermore, it emerged that about two-thirds of the incubators surveyed are public in nature.

Throughout the past few years, the Social Innovation Team (SIT) as Social Innovation Monitor (SIM) has made an effort to preserve the Italian mapping. Beginning with the 2017 annual report (reporting data of 2016), SIM has delivered a report once a year for the monitoring of the Italian entrepreneurial ecosystem.

Confronting the data from 2012 of the study of Auricchio et al. (2014) and the data of 2020, from the SIM report of 2021, the percentage of incubators in the northern areas was slightly below 50% in 2012 and it climbed by around 10 points until 2020 (**Table 2**).

	2012 Distribution	2020 Distribution
North-West	17.3%	33%
North-East	31.0%	24%
Centre	29.3%	25%
South and islands	22.4%	19%

Table 2: Incubators distribution on Italian soil - comparison between 2012 and 2020

Source: SIM (2021) and Auricchio et al. (2014)

Focus on Emilia-Romagna

Since the final aim of this research work is to analyze the entrepreneurial ecosystem in Emilia-Romagna, it is interesting to look at the data of the region. As can be seen in the

table below (**Table 3**) the percentage of incubators in the northern areas was 15.5% in 2012 and fall a little by 2020, although, according to the sim 2021 report (SIM report 2021), it is the second region after Lombardia in terms of density of incubators per square kilometer (**Figure 6**).



Table 3: Incubators distribution on Emilia-Romagna soil - comparison between 2012 and 2020

Figure 6: Number of incubators in reference to km² by region

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Source: SIM (2021)
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In the next chapters, the survey of the entrepreneurship support ecosystem in Emilia-Romagna will be explored in depth.

3. Methodology

As it was previously explained, the primary goal of this study is to comprehend the characteristics and development of the organizations that support entrepreneurship in Emilia-Romagna during 2021¹¹. This work is the result of the collaboration between the SIM team and ART-ER, an entrepreneurship support network in Emilia-Romagna, and it is based on the study previously carried out in 2019¹².

This chapter tries to lay out every step required to examine the growth and dissemination of incubators in Emilia-Romagna.

This investigation has been developed relying on several studies, including those of Corbetta and those of Cardano et al. (2015; 2011).

The methodology that follows consists of four basic components:

- 1) *Updating the list of the incubators*: in the first phase a search for all operational incubators in Emilia-Romagna territory was done.
- Setting up the database: starting with the list created in the first stage, a database was created with the necessary information about each organization. More details about the database are provided in the subsequent paragraph.
- 3) Creation of the survey: in this phase, the questionnaire was created. The questionnaire contained various questions, about registry information, financial data, activities of the incubators, etc., that will be better described in the following. It is divided into two parts, the first one contains questions extracted from the Italian Questionnaire, while the second part has questions specific to Emilia-Romagna.
- 4) Survey submission: after the survey was created, it was uploaded to Survey Monkey, and then distributed to the incubators of the Emilia-Romagna region listed in the database. In order to increase participation rates and get data that were as good as possible, it has been fundamental the collaboration between SIM and ART-ER.

Finally, after these four stages, the data were collected and analyzed.

¹¹ The study has been carried out in 2022 with data referring to 2021.

¹² The study was carried out in 2019 with data referring to 2018.

3.1. Updating the list of incubators

In this first stage, the work started with the analysis of the database, created in 2022 a few months before the beginning of this work, for the monitoring of incubators and accelerators in Italy¹³. It has been decided to start from this database and not from the one created in 2018 for the Emilia-Romagna incubators since the Italian one resulted to be more updated and precise. From the database of Italian incubators, the Emilia-Romagna organizations were extracted and afterward, it has been checked whether they were still active.

Starting with the relevant website and social media page, each incubator was thoroughly examined. When in doubt, they were contacted directly via email and telephone. Moreover, the new incubators that were discovered during the research time were added. The result was a merger between the database of Italian organizations, with the addition of new ones.

This initial stage of mapping and definition of incubators and accelerators in Emilia-Romagna has been conducted by the SIM team with the essential help of ART-ER, which, as stated before, is an organization that promotes and manages entrepreneurship in Emilia-Romagna, and therefore was aware of what organizations could be linked to incubation and acceleration activities.

At the end of this updating phase, it has been obtained a population of 38 organizations from Emilia-regional Romagna's ecosystem, and they were contacted for this investigation. Compared to the previous version of the report, from 2019 (with data referring to 2018), 8 additional facilities were identified.

3.2. Setting up the database

This methodology's second phase sought to compile a comprehensive database of information by gathering a range of data about each of the incubators previously mentioned. This phase of compiling and constructing the database has been carried out by the SIM team.

The database was composed of the following parts:

¹³ Social Innovation Monitor (SIM) research team delivers each year a survey "Impact of Italian incubators/accelerators", aiming at monitoring and analyzing the organizations that support entrepreneurship in Italy.

- Incubator's name: The names of all incubators were compiled into a list, after research was carried out on all the operational and newly founded incubators up to December 2021.
- **Institutional nature:** Aiming to distinguish between public, public/private, and private incubators in this second column the institutional name of each incubator has been indicated.
- VAT number and Tax Code: This information has been added, in order to have a better identification of each incubator.
- Email, Telephone, and Website: The emails found on the websites of the incubators have been gathered in this column and later used for the questionnaire distribution. Moreover, telephone numbers have been added for further communication; and finally, also the websites have been indicated.
- Location: For each incubator has been indicated the address, the city, and the province, in order to locate the incubator. This information was necessary for the analysis of the geographical distribution that was later conducted.
- Date of foundation and age: The incubators' foundation year was seen as being crucial data for the investigation. These statistics provide an actual summary of the incubator phenomenon's regional dissemination by average age.
- Sharing list of supported organizations: For each incubator has been indicated whether the incubators shared or not the list with the information about their supported organizations.
- 2021's Italian Questionnaire Completed: in this column has been indicated whether the incubators completed or not the SIM Italian Questionnaire for the year 2021. This information was necessary since the organizations that already answered the Italian Survey could skip the filling of the first part of the questionnaire.

Later, after the completion of the first database, a second database has been created, in which the list of organizations supported by each incubator has been listed. The columns of the second database were structured as follows:

- Reference incubator
- Incubated startup/organization
- VAT number startup/incubated organization

• VAT number of the incubator

Finally, a third database has been constructed. This database has been used for conducting the comparison analysis between the incubators of Emilia-Romagna and the ones located in the rest of Italy and has been compounded considering only the organizations Fully falling within the definition of an incubator or accelerator and active throughout 2021, and therefore two organizations were not included, as it will be explained in the following chapter.

3.3. Creation of the survey

The questionnaire has been developed using as a reference the one done in 2019 (with data referring to 2018).

The survey has been divided into two parts, the first with more general questions about the incubation activity of the organizations and the second one tailored specifically for the organizations of Emilia-Romagna.

More precisely, the first part of the questionnaire was composed of questions taken from the survey sent to all the Italian incubators, and therefore it was not specific to Emilia-Romagna. It is clear that, since it was adapted from the Italian questionnaire, the SIM team created this section.

This part aimed at getting data that could be used for the comparison analysis between organizations from Emilia-Romagna and the ones from the rest of Italy.

The section was composed of several macro-areas, which are listed in the following:

- General information: name of the incubator, institutional name, and other general information about the incubator.
- **Registry information:** question about the year of the constitution of the incubator, the average number of employees measured with the full-time equivalent (FTE) method, and the square meters available for incubation activities.
- **Companies:** in this area, it was asked whether the organization asked for a participation fee or a percentage in equity to participate in its incubation programs. Moreover, it was asked about the number of incubation requests, the number of startups incubated, and, finally, financial data (revenue stream).

- **Funding:** the number of funds given to incubated companies, amount of equity shares obtained, disposability to organize workshops or seminars for companies, etc.
- Activities: in this last area it was asked about the services offered by the incubator to the supported organizations.

The organizations that already answered the Italian Survey could skip the filling of the first part of the questionnaire and move directly two the second one, since, as stated before, this first part was in common with the Italian one.

The second part of the survey has been developed thanks to the collaboration between the SIM team and ART-ER, and it is specific to Emilia-Romagna.

Also this second section has been broken down into arguments, as can be seen in the list below:

- Incubator facility: in this group of questions it has been investigated the structure that the incubator has. In particular, it has been asked about the square meters that the incubator provides to the supported organizations as office space, the square meters for community/group activities, and finally the square meters for labs, product development, and prototyping activities.
- Contracts and agreements: in this section, it has been questioned whether the incubator had active contracts and/or agreements with entities in the regional ecosystem; moreover, it was asked if it took part in open innovation programs with private entities, and if the incubator had structured relationships with other incubators/accelerators in other countries to facilitate the development of startup markets.
- Enterprises: the questions made in this part regarded the entrepreneurial teams and the startups supported by the incubators, and not the incubators themselves. It has been asked if the startups had the legal office inside or outside Emilia-Romagna, whether they benefited from EU funds, and if the incubated startups were university spinoffs. Moreover, it was asked if the supported organizations could be considered innovative startups under L221/2012¹⁴ legislation, and if they

¹⁴ With Decree Law No. 179 of October 18, 2012 (Law No. 221/2012), the legislature introduced into the system a regulatory framework to support the birth and growth of new innovative enterprises (so-called innovative start-ups) with the explicit aim of fostering technological development, new entrepreneurship, and employment, particularly of young people. The measures essentially consist of simplifications to the

had established international collaborations or achieved exports and what was the total number of patents submitted by the entrepreneurial teams and startups. Finally, it has been asked about the average revenue of the startup and the FTE of the startups.

- **Policy:** this section investigated the policy implemented by the incubators. It has been demanded if the incubators use public funding (including European-funded projects) directed to support incubated or accelerated startups/teams; and how the amounts of funding received divided as a percentage between provincial, regional, national, and international.
- Feedback and suggestions: in this last part incubators were asked to leave their suggestion indicating possible policies and measures that could be introduced by the Emilia-Romagna Region to foster the growth and sustainability of the incubator/accelerator system in the region; and finally, the possible other initiatives to be implemented regionally (e.g., by the in-ER network) to benefit all incubators in the region and the startups they support.

Finally, at the very end of the questionnaire, it was requested to provide the list of the tenants that had been incubated in 2021 together with the appropriate VAT numbers. The complete questionnaire is reported in Annex A.

3.4. Survey submission

For the creation and submission of the questionnaire, the online software SurveyMonkey¹⁵ was used; in addition to that, it also has been created the questionnaire in Microsoft Word format.

The invitation to participate in the survey was sent using the institutional email on October 3rd, 2022 to the 38 organizations that were previously pointed out.

Subsequently, three reminder emails were sent by the ART-ER during the month of October, between the 10th and the 24th, based on the evolution of the results obtained. The objective of the three reminders was to kindly urge incubators to fill out the questionnaire;

establishment of such companies, thus derogations from company law, reduction of start-up tax burdens and labor support facilities (hiring of staff), and tax breaks to investments in the venture capital of innovative startups.("Start-up innovative, PMI innovative e incubatori certificati", 2020)

¹⁵ https://it.surveymonkey.com/

in fact, it was fundamental to get as many answers as possible to obtain meaningful data for the subsequent analysis. Moreover, in the last reminder, it was signaled that the survey duration had been extended by one week, in order to give extra time to organizations that had not filled out the survey yet.

The survey on SurveyMonkey was composed of some compulsory questions and some electives (for example, incubators could choose to indicate or not the name of the organizations they collaborated with). The majority of the questions were quantitative, and the data obtained were used to compute the analysis that is presented in the next chapter. However, there were also some qualitative questions, where, for example, the incubators could give suggestions or feedback about the entrepreneurial ecosystem in Emilia-Romagna.

In addition, to speed up the data-cleaning process, filters were set up to avoid outliers, in this way respondents were forced to give answers within a certain range.

The respondents that had already completed the Italian Questionnaire didn't have to fill out the first part of the survey, since questions of this part were extracted from the Italian one that participants had received a few months prior.

Monitoring the outcomes and getting in touch with the incubators throughout this period allowed the collection of a sample that was as representative as possible, this process lasted until the beginning of November.

After the filled questionnaires have been received, and eventually also during the analysis phase when data that looked like outliers were encountered, the organizations were contacted to get further explanations and in case the information provided was incorrect it has been asked to correct the answer to the survey. This has been done to avoid considering the wrong data in the analysis.

The phase of survey submission has been managed by the collaboration between the SIM team and ART-ER.

At the end of this phase, it has been formed a sample of 29 organizations, with a rate of response was 76%, which could be considered a brilliant result.

3.5. Data analysis

This last stage was crucial to finalize the process, providing concluding remarks, and highlighting intriguing open questions for additional future research.

When the deadline for filling out the questionnaire was approached, the data were collected. After the collection, the data were examined and cleaned. As explained before, when outliers were found the incubators were contacted in order to get the right data, and eventually, they were excluded from the analysis. At the end of this cleaning phase, it has been obtained a sample of 29 organizations. This sample was used to perform the analysis regarding the questions specific to Emilia-Romagna, (i.e., the second part of the questionnaire), whereas the comparison analysis between Emilia-Romagna and the rest of Italy has been done considering only 27 organizations. This is because this last analysis has been performed considering only the part of the Emilia-Romagna sample that fully falls within the definition of an incubator or accelerator active during the year 2021.

The data analysis was done between November 7^{th,} 2022, and December 6th, 2022. Histograms, box charts, and other fundamental visualizations provided by the tool have been utilized to guide the analysis in Excel sheets.

The following chapter reports the analyses of the population of Emilia-Romagna incubators.

4. Analysis and results

The following analysis has been divided into the following sections:

- 1) Incubators and accelerators' mapping:
 - Description of the analyzed sample. The final sample at the end of the phase of database creation, which has been presented in the previous chapter, was composed of 29 organizations. The complete sample of 29 entities has been used for only one part of the analysis, which was focused on Emilia-Romagna only, while for the comparison analysis with the rest of Italy, two entities have been excluded since didn't fall completely into the definition of incubator/accelerator. Finally, it has been described the Italian sample, which has been defined by the SIM team for the survey for the monitoring of entrepreneurship in Italy in 2022. The organization in Italy outside the Emilia-Romagna region wewas08.
 - *Geographical distribution*. In this section it is presented how the organizations are spread among Emilia-Romagna, and it highlighted how the major number of entities are concentered around the province of Bologna.

2) Comparison analysis of Emilia-Romagna and the rest of Italy:

With the final goal of understanding how Emilia-Romagna differs from the rest of Italy in fostering entrepreneurship, a comparison study he Emilia-Romagna and the other regions of the country is offered in this section.
The topics of these analyses have been taken from the national survey con-

ducted by the SIM team.

3) Insight into Emilia-Romagna:

- In this last section of the chapter, the analysis focuses specifically on the Emilia-Romagna region.

The topics of the analyses were developed by ART-ER, which, as an organization in its own territory, is fully aware of the entrepreneurial situation in Emilia-Romagna.

4.1. Incubators' mapping

4.1.1. The analyzed sample

Emilia-Romagna

The entities identified within the regional ecosystem in Emilia-Romagna and contacted for this analysis are 38. Of these, 29 contributed to the survey by responding to the questionnaires sent out, allowing for an excellent response rate of 76%.

Within the 29 organizations, there were 2 entities that were not fully framed within the definition of incubator or accelerator but, nonetheless, play a significant role in promoting entrepreneurship in the region. Therefore, in order to provide a more comprehensive picture of the ecosystem of support for entrepreneurship and innovation within the region, these entities were included in the analysis regarding the Emilia-Romagna region and excluded from the comparison analysis with the rest of Italy.

In comparison to the earlier study, starting in 2019 (with data corresponding to 2018), 8 more facilities were noted.



Figure 7: Emilia-Romagna - Population and analyzed sample Source: SIM - ART-ER (2022) Databases

Sub-sample of comparison with the rest of Italy

In the analyses that follow, some comparisons with the rest of Italy will be set forth. These comparisons were made by assessing the responses obtained from the present survey, conducted for the region, with the data contained in the 2022 "Impact of Italian Incubators/Accelerators" survey conducted by the Social Innovation Monitor (SIM) research team.

The comparison between the results of the regional and national subjects was performed only for that part of the Emilia-Romagna sample fully falling under the definition of incubator or accelerator and active¹⁶ during the year 2021 (**Figure 8**).



Figure 8: Emilia-Romagna - Population and sub-sample analyzed for comparisons with the rest of Italy

Source: SIM - ART-ER (2022) Databases

Italy

The Social Innovation Monitor (SIM) team surveyed 237 incubators and accelerators active on Italian soil in 2021, 208 of them outside Emilia-Romagna (Figure 9).



Figure 9: Rest of Italy - Population of incubators and accelerators in Italy, excluding Emilia-Romagna, and sample analyzed

Source: SIM - ART-ER (2022) Databases

In the other regions of Italy, the number of incubators and accelerators present is, on average, 11 (median 6), well below the 29 incubators and accelerators in Emilia-Romagna, which has a less concentrated reality (**Table 4**).

¹⁶ For the purposes of this survey, business incubators and accelerators are defined as "organizations that actively support the process of creating and developing innovative new businesses through a range of services and resources offered either directly or through networks of partners" (Aernoudt, 2004; Sansone et al., 2020; SIM report, 2021)

	Emilia-Romagna	Rest of Italy
Mean	(29)	11
Median	(29)	6
Total Number	29	208

Table 4: Regional comparison - Regional number of incubators and accelerators in 2021

Source: SIM - ART-ER (2022) Databases

4.1.2. Geographical distribution

Aiming at comprehending the incubation activities in Emilia-Romagna, it is essential to look at the geographical distribution in order to identify the area of the region where the phenomenon is more pronounced.

The analysis of the territorial distribution has been conducted on the 38 organizations identified in the first database. As reported in **Table 5**, the analysis reveals a clear concentration of entities in the province of Bologna, where nearly 45% of the surveyed entities are located. The provinces of Parma and Reggio Emilia have the lowest rate of entities promoting innovation and entrepreneurship in their territory, 2.6% of the population; this outcome is consistent with what was highlighted in the previous report (conducted in 2018).

	% of the population	% the sample
Bologna	44.7%	44.8%
Ferrara	5.3%	3.4%
Forlì-Cesena	7.9%	6.9%
Modena	15.8%	17.2%
Parma	2.6%	3.4%
Piacenza	5.3%	3.4%
Ravenna	10.5%	13.8%
Reggio Emilia	2.6%	3.4%
Rimini	5.3%	3.4%
Number of organizations	38	29

Table 5: Emilia-Romagna – Geographical distribution of the population and sample analyzed.

Source: SIM - ART-ER (2022) Databases



Figure 10: Emilia-Romagna – Geographical distribution of the organizations Source: SIM - ART-ER (2022) Databases

Figure 10 exhibits the number of incubators/accelerators active in each province of the region; as stated before the province with the highest number of organizations is Bologna, which hosts 17 entities, followed by the province of Modena with 6.

Comparing the number of entities promoting entrepreneurship and innovation in Emilia-Romagna active in 2021 with the area of the territory, it emerges that there are 0.13 incubators per 100 square kilometers in Emilia-Romagna.

While in terms of the ratio of the number of entities to the region's population, the result is 0.65 incubators per 100 thousand inhabitants. Comparing the rest of Italy with only the Emilia-Romagna incubators and accelerators active in 2021, a more capillary territorial presence in Emilia-Romagna is evident than in other Italian regions (**Table 6**). The data confirm what was highlighted in the previous report.

	Emilia-Romagna ¹⁷	Rest of Italy
Incubators per 100 km ²	0.13	0.08
Incubators per 100,000 inhabitants	0.65	0.40
Number of organizations	29	208

Table 6: Regional comparison - Concentration of incubators in 2021

Source: SIM - ART-ER (2022) Databases

4.2. Emilia-Romagna and the rest of Italy

In the following paragraphs, a comparison analysis between Emilia-Romagna and the rest of Italy is presented, in order to understand how the region stands out in promoting entrepreneurship in the area compared to the rest of the country.

The topics of these analyses have been taken from the national survey conducted by the SIM team, that, as stated before, identified 208 organizations outside Emilia-Romagna. as concerns the sample of organizations from Emilia-Romagna, only those entities that fully fell into the definition of active incubators¹⁶ were considered (sub-sample of 27 organizations).

¹⁷ Only those entities in Emilia-Romagna that fully fell within the definition of an incubator or accelerator and were active throughout 2021 were considered for comparison with the rest of Italy.

4.2.1. Year of foundation

Looking at the distribution of the years of establishment of regional entities, there is a peak of 5 entities established in 2017 and 2018.

Interestingly, about 70% of the 28 responding entities were established after the year 2015.

This figure is likely due to the fact that in 2015 the Emilia-Romagna Region, through the measure "Activity 5.1 of the Regional Program for Productive Activities 2012-2015: Support for the development of infrastructure for competitiveness and for the territory," financed a total of 42 projects out of the 4 expressions of interest activated - 23 of which were presented by incubators or accelerators surveyed in this mapping - for a total investment of more than 35.6 million euros, against a total regional contribution of 19.7 million euros.



Figure 11: Emilia-Romagna - Year of foundation and age of the entities in the sample

Source: SIM - ART-ER (2022) Databases

The mean and median age of the analyzed entities, 6 and 5 years respectively, shows a particularly young scenario in Emilia-Romagna.

The data is even more interesting when comparing only Emilia-Romagna's incubators and accelerators active in 2021, for which the mean and median ages are 7 and 5 years, respectively, with those in other Italian regions, for which the mean and median ages are 10 and 7 years, respectively. The ecosystem of support for entrepreneurship and innovation is, therefore, younger in Emilia-Romagna than in other Italian regions.

	Emilia-Romagna ¹⁸	Rest of Italy
Mean	2015	2010
Median	2017	2014
Number of answers	27	74

Table 7: Regional comparison - Year of foundation of entities

Source: SIM - ART-ER (2022) Databases

4.2.2. Requests received and organizations incubated

The number of incubation requests that incubators receive and the number of tenants that the incubators successfully supported are two intriguing metrics that have been examined. Because it is obvious that the number of tenants in an incubator is connected with the number of requests made, it is interesting to present the findings as correlated.

Number of incubation requests

The average number of incubation and acceleration requests received by institutions in 2021 stands at 68.6, with a median value of 20. Of the 27 institutions analyzed, 14 did not exceed 25 annual incubation requests and, of these, 12 did not exceed 10. The data appear to be increasing when compared with the number of requests received

by institutions during 2018 (previous average of 29.0 and median of 15).

¹⁸ Only those entities in Emilia-Romagna that fully fell within the definition of an incubator or accelerator and were active throughout 2021 were considered for comparison with the rest of Italy.



Figure 12: Emilia-Romagna - Number of incubation requests received by sample institutions in 2021

Source: SIM - ART-ER (2022) Databases

Comparing the number of incubators and accelerators active in Emilia-Romagna in 2021¹⁸ with the rest of Italy, the requests for accompaniment received individually by entities are significantly lower than the requests received by incubators and accelerators in other regions.

This can be explained in part by the greater number of incubators and accelerators present in Emilia-Romagna, where the density of entities is almost twice as high as the average in other Italian regions (see section 3.1.2. Geographical distribution).

However, it is important to highlight that the more numerous facilities may tend to be smaller in size.

Table 8: Regional comparison	- Incubation	and acceleration	requests rec	eived from	institutions

	Emilia-Romagna ¹⁸	Rest of Italy
Mean	70.9	175.3
Median	25	51
Number of answers	26	72

Source: SIM - ART-ER (2022) Databases

Number of supported startups

In 2021, the number of startups incubated by each institution analyzed within the region averaged 15.5, with a median of 8.5. Again, the figures are increasing when compared with the number of startups incubated by the entities during 2018 (previous average of 10.1 and median of 7.5).



Source: SIM - ART-ER (2022) Databases

Compared to other Italian regions, in 2021 on average a single incubator/accelerator¹⁸ in Emilia-Romagna housed less than half the number of entrepreneurial teams and startups incubated at incubators in other regions (**Table 9**).

Again, the difference from the rest of Italy is at least partly explained by the density of incubators and accelerators present in Emilia-Romagna being almost twice as high as the average in other Italian regions (see section 3.1.2. Geographical distribution).

	Emilia-Romagna ¹⁸	Rest of Italy
Mean	15.9	35.9
Median	9	17
Number of answers	27	72

Table 9: Regional comparison-Number of incubated and accelerated startups

Source: SIM - ART-ER (2022) Databases

4.2.3. Number of employees in incubated organizations

Most of the entities supporting innovation and entrepreneurship analyzed in Emilia-Romagna employed a small number of Full Time Equivalent (FTE) employees in 2021, with an average of 6.2 and a median of 3 employees per entity. Three of the institutions analyzed had no employees in 2021, suggesting that their activities were managed solely through the contribution of founding members and volunteers. This figure is up from the previous report (mean 2.6 employees and median 2 employees).



Figure 14: Emilia-Romagna - Number of employees of the entities in the sample in 2021

Source: SIM - ART-ER (2022) Databases

Comparing only the region's incubators and accelerators active in 2021 with those distributed in the other Italian regions, it appears that the number of FTE employees at Emilia-Romagna incubators in 2021 was on average less than half the number of FTE employees at institutions in the other regions (**Table 10**). The figure is in line with the lower average number of startups housed at individual institutions, which is about half of the rest of Italy (see section 3.2.2. Requests received and incubated organizations).

	Emilia-Romagna ¹⁸	Rest of Italy
Mean	6.4	17.3
Median	3	5
Number of answers	27	74

Table 10: Regional comparison-Number of employees in institutions [FTE]

Source: SIM - ART-ER (2022) Databases

4.2.4. Services offered

One question of the survey asked the respondents to say if they provided a certain set of services to the tenants, in order to gather data on the services provided.

They were specifically asked if they offered the set of services to a) none of the tenants; b) to little of them; c) to many of them, or d) to all of them.

The selections were then given a weight in order to get a numeric value as an index of the importance given to the specific set of services.

	Weight
None	0
To few	0.25
To many	0.75
To all	1

		-	-	-	-
<i>Table 11:</i>	Weight	attributes	to the	single	selection

Followingly, in order to calculate the importance index the next formula has been applied:

Importance Index = $(n^{\circ} 'none' \times' none' weight + n^{\circ} 'tofew' \times' tofew' weight + n^{\circ} 'to many' \times 'to many' weight + n^{\circ} ' to all' \times' to all' weight)/tot$

The set of services considered in the survey are the ones generally offered by incubators, that have been deeply described in the literature review of this research work (see 1.3. Services offered to supported organizations).

When analyzing the services offered to startups hosted by Emilia-Romagna institutions in 2021, it emerges that great importance is placed on relationship development and networking for startups, followed by managerial accompaniment, availability of physical space for startups, support in seeking funding, and entrepreneurial and managerial training.

Comparing the Emilia-Romagna incubators and accelerators active in 2021 with those in other regions of Italy, a slightly greater propensity to provide social impact assessment services and training and consulting services on Business Ethics and Corporate Social Responsibility (CSR) emerges (**Figure 15**).

The results obtained in this analysis seem to confirm the findings of the previous report.



Figure 15: Regional comparison - Completeness of services offered by institutions in 2021

Source: SIM - ART-ER (2022) Databases

The above graph represents the completeness of the range of services provided by institutions to startups and accompanying entrepreneurial teams. The comprehensiveness of the offer increases as one moves from the center to the outside of the graph and is determined by the frequency with which the institutions in the sample provide these types of services.

Square meters available for entrepreneurship support activity

One of the most popular services at these institutions is the provision of physical space for incubated startups. The total space available for incubation or acceleration activities in 2021 averaged 817.3 square meters for each of the institutions analyzed within the region, with a median value of 600.0 square meters. The figure shows an increase in the number of square meters available for entrepreneurship support activities compared to the year 2018 (average 778.3 square meters and median 425.0 square meters).

Table 12.	: Emilia-Romagna	- Square meters	available for	r incubation	and acceleration	on activities
-----------	------------------	-----------------	---------------	--------------	------------------	---------------

	Emilia-Romagna
Mean	817.3 mq
Median	600 mq
Number of answers	29

Source: SIM - ART-ER (2022) Databases

Comparing only the incubators and accelerators active in 2021 in Emilia-Romagna with those in the other Italian regions, a median figure emerges that is slightly lower than that recorded for the other regions; reflecting the fact that, although the latter have a much higher median figure due to some very large centers, Emilia-Romagna's facilities are similar in size to those of most of the entities present in the rest of Italy (**Table 13**).

	Emilia-Romagna ¹⁸	Rest of Italy
Mean	840.6 mq	3167.4 mq
Median	600 mq	745 mq
Number of answers	27	74

Table 13: Regional comparison - Square meters available for incubation and acceleration activities

Source: SIM - ART-ER (2022) Databases

In more detail, in 2021 a startup hosted at one of the realities in Emilia-Romagna had an average of 50 square meters available for office use (with a median of 20 square meters), 320.4 square meters for collective activities (with a median of 238.5 square meters), and 120.3 square meters of laboratories for product development or prototyping activities (with a median of 35 square meters).



Figure 16: Emilia-Romagna - Spaces made available by the entities in the sample in 2021 Source: SIM - ART-ER (2022) Databases

4.2.5. Compensation for access to incubation programs

Approximately half of Emilia-Romagna's innovation and entrepreneurship support entities in 2021 did not ask for any consideration for the services offered to entrepreneurial teams and startups accompanied within their incubation and acceleration paths, neither in terms of monetary (fees) nor in terms of corporate holdings (equity), where the percentage of entities not asking for any consideration reached 62 percent. (**Table 14**). The percentages seem to be in line with 2018 values.

Table 14: Emilie	a-Romagna-1	Request for	participation	fee or equi	ity by	, entities	in	2021
------------------	-------------	-------------	---------------	-------------	--------	------------	----	------

	Request for the participation fee	Request for participation equity
Never	45%	62%
For certain programs	31%	31%
Always	24%	7%
Number of answers	29	29

Source: SIM - ART-ER (2022) Databases

The same holds true for the figure on Emilia-Romagna's active incubators and accelerators alone in 2021¹⁸, which is not significantly different from the Italian context, where, in any case, incubators and accelerators in 2021 tended to charge more frequent fees and slightly less equity than Emilia-Romagna in order to access their programs (**Figure 17 and Figure 18**).



Figure 17: Regional comparison - Percentage of institutions¹⁸ that required a participation fee in 2021

Source: SIM - ART-ER (2022) Databases



Figure 18: Regional comparison - Percentage of institutions¹⁸ that required an equity share in 2021 Source: SIM - ART-ER (2022) Databases

The entities that during 2021 requested corporate participation from the entrepreneurial teams and startups accompanied within their incubation and acceleration paths were 30 percent of the total sample in Emilia-Romagna. This result is up from 2018 (in 2018 the figure was 16 percent).

Comparing only Emilia-Romagna's incubators and accelerators active in 20214 with the rest of Italy, however, a figure (31 percent) emerges that is higher than the 22 percent recorded in other regions (**Figure 19**).



Figure 19: Regional comparison – Entities¹⁸ that applied for corporate shares during 2021 Source: SIM - ART-ER (2022) Databases

Among the entities that received equity from accompanying startups in 2021, in Emilia-Romagna, 25 percent acquired company shares as remuneration for their services and performances (work for equity) while 88 percent with the purpose of investment. In the rest of Italy, on the other hand, several incubators and accelerators stated that they acquired shares in the incubated startups both in order to remunerate their own services and performances (in 71 percent of cases) and for investment purposes (in 71 percent of cases).

The comparison shows, therefore, that in the rest of Italy, several incubators have acquired company stakes for both purposes, i.e., venture capital investment and remuneration for their own performance and services; in Emilia-Romagna, on the other hand, a large part of the sample pursued venture capital investment and only a small part also sought remuneration for their own performance and services (**Figure 20**).



Figure 20: Regional comparison¹⁸ - Purpose of corporate holdings in 2021

Source: SIM - ART-ER (2022) Databases

4.2.6. Funding received by incubated organizations

An important indicator of the incubators' performance is the number of financial funding received by incubated organizations.

Funding received by startups incubated in 2021 at Emilia-Romagna institutions (considering equity investments, grants, public calls, etc.) amounted to an average of almost 1,970.5 thousand euros per institution, with a median value of 25 thousand euros. As well evidenced by the distribution visible in **Figure 21**, for most entities, the funding raised was less than 250 thousand euros.



Figure 21: Emilia-Romagna - Distribution by institution of funding raised by incubated entities in 2021

Source: SIM - ART-ER (2022) Databases

Funding raised by startups at other Italian incubators in 2021 was lower on average than funding raised at Emilia-Romagna institutions, albeit with a much higher median, as can be seen by comparing other Italian regions with active incubators and accelerators in Emilia-Romagna in 20214 (**Table 15**).

	Emilia-Romagna ¹⁸	Resto di Italia
Media (k€)	1971	1804
Mediana (k€)	25	300
Numero risposte	24	62

Table 15: Regional comparison - Funding received by incubated and accelerated startups in 2021

Source: SIM - ART-ER (2022) Databases

4.2.7. Revenue structure

Revenues of organizations active in 2021 in Emilia-Romagna were derived 25% from the provision of services to entrepreneurial teams and supported organizations, 22% from grants, funding, and co-funding from local, national, and international calls, 18% from rents, 16% from donations, another 16% from other revenues (such as revenues related to



science park management activities, fee-based scouting and open innovation activities for companies), and the remaining 3% from donations (Figure 22).

Figure 22: Emilia-Romagna - Division of institution revenues in 2021

Source: SIM - ART-ER (2022) Databases

Comparing only incubators and accelerators active in 2021 in Emilia-Romagna with those in other Italian regions, the results recorded in Emilia-Romagna are in line with those found in the rest of Italy (**Figure 23**).



Figure 23: Emilia-Romagna - Division of institution revenues in 2021

Source: SIM - ART-ER (2022) Databases

The sources of revenue that have been considered for this analysis have been previously discussed and described in the literature review of this paperwork (see section 1.4. Sources of income and costs for incubators)

4.3. Insight into Emilia-Romagna

In the next section of this chapter, the analysis focuses specifically on the Emilia-Romagna region.

As underlined before, all 29 organizations listed in the database created by SIM and ART-ER were considered for these analyses, thus including the two previously excluded ones. This choice was made considering that, although they do not fall completely within the definition of active incubators, they contribute to the promotion of entrepreneurship in the Emilia-Romagna ecosystem.

The topics of the following analyses were developed by ART-ER, which, as an organization in its own territory, is fully aware of the entrepreneurial situation in Emilia-Romagna.

4.3.1. Origin of incubated entities

Most (65%) of the entrepreneurial teams and startups incubated and accelerated in 2021 in Emilia-Romagna were from the region itself. Thirty-two percent were from other Italian regions, and only 2%, corresponding to eight of the 28 entities analyzed, were based abroad (**Figure 24**). The substantial slice of entities from other regions of Italy is indicative of the attractiveness of the region's entrepreneurial ecosystem.

The figure appears to be on the rise compared to 2018. In 2018, in fact, the percentage of subjects from other regions was 18.1 percent and the percentage of subjects from abroad was 0.4 percent.


Figure 24: Emilia-Romagna - Origin of entrepreneurial teams and startups incubated in 2021 Source: SIM - ART-ER (2022) Databases

4.3.2. Incubated subjects beneficiaries of European funds

In just under half of the entrepreneurship and innovation support institutions in Emilia-Romagna at least one of the entrepreneurial teams or startups incubated in 2021 benefited from European funds such as SME Instrument and the like (**Figure 25**). This value is down from the year 2018 (mean 1.2 and median 0).



Source: SIM - ART-ER (2022) Databases

4.3.3. Subjects incubated registered as innovative startups in the Business Registry

During 2021, the average number of startups incubated at each institution promoting entrepreneurship and innovation in Emilia-Romagna registered in the special section of the Business Registry dedicated to innovative startups under Law L221/2012¹⁹ was about 7.8, with a median 6 (**Figure 26**).



This value is increasing compared to the year 2018 (mean 5.5 and median 4).

Figure 26: Emilia-Romagna - Startups incubated in 2021 registered in the special section of the business registry

Source: SIM - ART-ER (2022) Databases

4.3.4. Subjects incubated with university spinoffs

In 2021 on average 1.5 (median 0.5) entrepreneurial teams/startups incubated at institutions were university spinoffs. Half of the institutions, however, did not host any university spinoffs in 2021 (**Figure 27**).

¹⁹ With Decree Law No. 179 of October 18, 2012 (Law No. 221/2012), the legislature introduced into the system a regulatory framework to support the birth and growth of new innovative enterprises (so-called innovative start-ups) with the explicit aim of fostering technological development, new entrepreneurship, and employment, particularly of young people. The measures essentially consist of simplifications to the establishment of such companies, thus derogations from company law, reduction of start-up tax burdens and labor support facilities (hiring of staff), and tax breaks to investments in the venture capital of innovative startups ("Start-up innovative, PMI innovative e incubatori certificati", 2020).



This analysis was not part of the previous report, so a comparison is not possible.

Source: SIM - ART-ER (2022) Databases

4.3.5. Subjects incubated for more than three years

In 2021 an average of 2.6 entrepreneurial teams/startups had been incubated at institutions for more than 3 years. More than half of the institutions, however, had not hosted the same entrepreneurial team/startup for more than three years in 2021 (**Figure 28**). This value is up from the year 2018 (mean 1.3 and median 0).



Figure 28: Emilia-Romagna - Subjects per sample institution incubated for more than three years in 2021

4.3.6. Subjects incubated with exports or international collaborations

Entrepreneurial teams and startups incubated in 2021 that had established international collaborations or exports in the same year averaged 1.7 at each institution (**Figure 29**). This value is up from the year 2018 (mean 1.3 and median 1).



Figure 29: Emilia-Romagna - Incubated entities at sample institutions with international exports or collaborations in 2021

Source: SIM - ART-ER (2022) Databases

4.3.7. Patents filed by incubated subjects

Entrepreneurial teams and startups incubated in 2021 at institutions in the analyzed sample that had filed patent applications through 2021 averaged 2.6 per institution. This value is up from the year 2018 (mean 1.3 and median 0).

Fifty percent of the responding entities reported that the subjects they incubated in 2021 had not filed any patent applications (Figure 30).



Source: SIM - ART-ER (2022) Databases

4.3.8. Average revenues of incubated subjects

Entrepreneurial teams and startups incubated in 2021 at the analyzed institutions had an average turnover of 59,224.00 euros in 2021, with a median of 18,320.00 euros (**Table 16**).

The average did not change significantly from the year 2018 (previous figure 64,923.00 euros) while the median seems to have dropped significantly (previous figure 40,000.00 euros). This would seem to indicate that there are fewer and fewer institutions incubating subjects with increasing turnovers, leading to an increase in disparity.

	Revenues	
Mean	59.224,00€	
Median	18.320,00€	
Number of answers	28	

Table 16: Emilia-Romagna - Revenues of incubated startups during 2021

Source: SIM - ART-ER (2022) Databases

4.3.9. Number of employees and partners of incubated startups

In 2021, the average number of workers, both partners, and employees, active in the startups hosted within the analyzed institutions stood at 4.7 people, with a median value of 4 workers (**Table 17**).

This value is up from the year 2018 (mean 2.8 and median 3).

Table 17: Emilia-Romagna - Number of workers in startups incubated during 2021

	No. of employees and partners
Mean	4.7
Median	4
Number of answers	27

Source: SIM - ART-ER (2022) Databases

4.3.10. Staff composition of incubated subjects

On average, the staff of the entrepreneurial teams and startups incubated in 2021 at the analyzed institutions were 65 percent college graduates, 24 percent female, 41 percent youth (under 35 years old), and 6 percent foreign (**Figure 31**).

Compared to the year 2018, the percentage of youth staff decreased (2018 figure of 56%). No further significant differences in staff composition are found.



Figure 31: Emilia-Romagna - Staffing composition of incubated entities by sample institutions in 2021

Source: SIM - ART-ER (2022) Databases

4.3.11. Active contracts and agreements among regional ecosystem entities

Most entities supporting the entrepreneurial and innovation ecosystem in Emilia-Romagna in 2021 had active contracts or agreements with other entities in the regional ecosystem, such as Technopoles, Network Laboratories, or other incubators (**Figure 32**).



Figure 32: Emilia-Romagna - Share of entities in the sample with active contracts/conventions with other ecosystem entities in 2021

Source: SIM - ART-ER (2022) Databases

For these entities, the average number of contracts and agreements stood at 2.1, with a median value of 2 (Figure 33).

This value is down from the year 2018 (mean 3.9 and median 3).



Figure 33: Distribution of the number of contracts and agreements by entity in the sample in 2021

Source: SIM - ART-ER (2022) Databases

4.3.12. Open innovation programs organized by the entities

More than half - 54 percent - of the entities supporting the entrepreneurial and innovation ecosystem in Emilia-Romagna in 2021 said they organized open innovation programs with private entities (**Figure 34**).



Figure 34: Emilia-Romagna - Sample entities participating in open innovation programs with private entities in 2021

Source: SIM - ART-ER (2022) Databases





Figure 35: Emilia-Romagna -No. companies with which entities organized open innovation programs in 2021

Source: SIM - ART-ER (2022) Databases

4.3.13. Open innovation programs organized by other private entities

Only 21 percent of entities supporting the entrepreneurial and innovation ecosystem in Emilia-Romagna in 2021 said they had participated in open innovation programs organized by other private entities, such as companies or foundations (**Figure 36**).



Figure 36: Emilia-Romagna - Sample entities participating in open innovation programs of other private entities in 2021

Source: SIM - ART-ER (2022) Databases

Entities that participated in open innovation programs organized by other private entities in 2021 reported that they carried out such projects on average with 2 companies (median 2) (**Figure 37**).



Figure 37: Emilia-Romagna -No. private entities with which open innovation programs were organized in 2021

Source: SIM - ART-ER (2022) Databases

4.3.14. Relations of entities with incubators in other countries

Only 29 percent of entities supporting the entrepreneurial and innovation ecosystem in Emilia-Romagna in 2021 said they had structured relationships with incubators in other countries to facilitate the development of startup markets (**Figure 38**).



Figure 38: Emilia-Romagna - Entities in the sample having relationships with incubators in other countries in 2021 Source: SIM - ART-ER (2022) Databases

Institutions that had structured relationships with incubators in other countries in 2021 reported that they engaged in such relationships on average with 9.3 entities (median 3) (**Figure 39**).



Source: SIM - ART-ER (2022) Databases

4.3.15. Public funding received by entities

In 2021, only 32 percent of the analyzed entities reported having received public funding (**Figure 40**).

This value is a decrease from the year 2018 when as many as 50 percent of the analyzed entities had reported receiving public funding.



Figure 40: Emilia-Romagna - Sample entities receiving public funds in 2021

Source: SIM - ART-ER (2022) Databases

Of the public funding received by the entities, 12 percent was provincial, 48 percent regional, 38 percent national, and 2 percent international (**Table 18**).

Compared to the year 2018, the percentage of institutions that reported receiving regional funding seems to have decreased the most (2018 figure of 64 percent).

 Table 18: Emilia-Romagna - Share of public funding received by entities in the sample in 2021

	Origin of public financing	
Provincial	12%	
Regional	48%	
National	38%	
International	2%	
Number of		
answers	9	

Source: SIM - ART-ER (2022) Databases

5. Conclusion

The primary goal of this thesis was to continue and update the research conducted in 2019 from the collaboration between the Social Innovation Monitor and ART-ER, which examined and mapped the organization supporting entrepreneurship in Emilia-Romagna in 2018. In this thesis the intention was to provide a better understanding of the incubation landscape in Emilia-Romagna, through conveying knowledge of the demographic characteristics and the performances of incubators and incubated start-ups with reference to the year 2021. In parallel with the research, various differential analyses were performed comparing the results of 2021 to the scenario in 2018, providing valuable insights into how the industry has changed over this period. Additionally, a variety of investigations were carried out to comprehend the differences between the Emilia-Romagna's ecosystem and the one of the remaining Italian regions.

The demographic analysis revealed a clear concentration of institutions in the province of Bologna in 2021, where nearly 45% of the surveyed organizations are located. The second-largest province in terms of concentration of institutions is Modena, which hosts nearly 16% of the facilities. The province of Parma and Reggio Emilia has the lowest rate of entities promoting innovation and entrepreneurship in its territory, 2.6% of the population. All these results are aligned with the ones found in 2019, with the data of 2018. Furthermore, it is intriguing to underline that most of the entrepreneurial teams and startups incubated and accelerated in 2021 in Emilia-Romagna were from the region itself (65%), 32% percent were from other Italian regions, and only 2% were based abroad.

When the number of organizations fostering innovation and entrepreneurship in Emilia-Romagna is compared to the size of the region, 0.13 incubators are found per 100 square kilometers active in 2021 in the region. Comparing data from the rest of Italy with incubators and accelerators active in 2021 in Emilia-Romagna, it results that in the rest of Italy are present on average of 0.08 incubators per 100 square kilometers. Therefore, it emerges clearly a more widespread territorial presence in Emilia-Romagna than in other Italian regions.

With respect to the analysis of 2019, 8 additional organizations for the support of entrepreneurship in Emilia-Romagna have been identified, signaling that the regional incubation market is expanding. It is interesting to see that the number of employees of an incubator, calculated in Full Time Equivalent (FTE), in 2021 is an average of 6.2; this number has considerably grown from 2018, where the mean was of 2.6 employees. Despite this growth, the figure seems to be rather minor than the number of employees of institutions in other Italian regions, where the mean of employees per incubator in 2021 was of 17.3. The figure is in line with the lower average number of startups hosted at individual institutions, which is about half the number in the rest of Italy. In fact, the average number entrepreneurial teams and supported organizations in each facility in Emilia-Romagna in 2021 was of 15.9, whereas in the rest of Italian regions the mean was of 35.9. This disparity could be at least partly explained by the density of incubators and accelerators present in Emilia-Romagna, that is almost twice as high as the average in other Italian regions.

Comparing the number entrepreneurial teams and supported startups in each organization in Emilia-Romagna in the 2021 with the data of 2018, it can be observed the number is increasing, registering a growth of almost the 65%. In fact, the total number of incubated startups in 2021 was of 434, while in 2018 was of 262. Moreover, analyzing the data more in depth, it results that of the 432 incubated startups, 242 has legal office in Emilia-Romagna and 218 could be considered innovative startups in accordance with the DL 221/2012.

The number of incubation requests received by incubators in 2021 amount to 68.6 on average, and totally counted 1851; the figures are higher when compared with the number of requests received by institutions during 2018, where the mean was of 29.0 and the total number of requests was 726. The number of incubation requests has increased of around 150%, moving form 262 total incubation request in Emilia-Romagna in 2019, to 432 in 2021.

Once again, comparing the data for incubators and accelerators active in Emilia-Romagna in 2021 with the rest of Italy, the requests for accompaniment received by entities are significantly lower in Emilia-Romagna. As in the case of number of employees, this difference can be explained by the greater number of incubators and accelerators present in Emilia-Romagna, considering that the more numerous facilities tend to be smaller in size. As concerns the funding received by startups incubated in 2021 at Emilia-Romagna institutions, amounted to an average of almost 1,970.5 thousand euros per institution. The figure is rising when compared with 2018 data; in fact, the total amount of funding received by startups in 2021 was of 47.3M€, versus 6.4M€ in 2018. It's important to declare that for many incubators this data was not available.

However, the number of startups that have received EU funds and the number of regional incubators that have received direct public funding to support startups appears to be decreasing, moving from 28 startups in 2018 to 23 in 2021.

When comparing the amount of funding received by startups incubated in organization of Emilia-Romagna with the data form the rest of Italy, it resulted that funding raised by startups at other Italian incubators in 2021 was lower on average ($1804k\in$) than that raised at Emilia-Romagna institutions, although the median was much higher ($25k\in$ for Emilia-Romagna and $300k\in$ for the rest of Italy).

Considering, then, the revenues that incubators in Emilia-Romagna got for their services in 2021, it appears that the main source of income derived from the provision of services to entrepreneurial teams and supported organizations (25% of the whole revenue structure), followed by the revenue coming from grants, funding, and co-funding from local, national, and international calls (16%). The results recorded in Emilia-Romagna are in line with those found in the rest of Italy.

Focusing more on the supported startups, it appears that the half of the incubators considered (14 incubators out of the total 28) hosted at least one startup that was a university spinoff; the total number of supported organizations that was a university spinoff was of 41. This analysis has been added on this last version of the investigation and therefore it is not possible to compare it with the previous one.

As concerns the number of workers, both partners and employees, present in the startups hosted within the analyzed institutions stood at 4.7 people on average. This value is rising from the year 2018, where the average number of workers were 2.8.

Moreover, it has been analyzed the composition of the workers of the incubated startups and it resulted that on average, the staff of the entrepreneurial teams and startups incubated in 2021 at the analyzed institutions were 65% college graduates, 24% female, 41% youth (under 35 years old), and 6% foreign. Compared to the year 2018, the percentage of youth staff decreased (2018 figure of 56%). No further significant differences are found on the composition of the staff.

Finally, given the small-to-medium nature of the Emilia-Romagna entities, the network of connections between actors in the area appears to be very well developed: 57% of the entities, in fact, said that in 2021 they had active contracts or agreements with other entities in the regional ecosystem to deliver their services; 54%, on the other hand, had organized Open Innovation programs with companies and 21 percent with other private entities. Although no real benchmark for comparison with the national is available, referring

to similar questions (in the national research, in fact, it is asked to "indicate the number of formal agreements of collaborations with corporations-for example, formal agreements for startup calls for open innovation programs"), it can be deduced that the percentage of organizations carrying out Open Innovation on the national territory is around 60 percent of respondents. The Emilia-Romagna figure thus seems not to deviate too much from the national average, also taking into consideration the fact that organizations in ER tend to be smaller. In this context, the role of networks and ecosystem coordination actors is therefore particularly important in order to increase the participation of Emilia-Romagna actors in Open Innovation activities.

To sum up, it can be claimed that the system of support for entrepreneurship and innovation in Emilia-Romagna seems to be characterized by structures that tend to be smaller than their Italian counterparts, but more spread throughout the territory. In fact, the ecosystem supporting entrepreneurship seems to be more decentralized.

Interestingly, Emilia-Romagna has about 13% of Italian incubators but only 7.5% of innovative startups (SIM Report, 2022). This could be further confirmation of the smaller size of entities supporting entrepreneurship in ER. However, this difference could also suggest a greater propensity to support startups outside the regional ecosystem.

5.1. Limitations and future research

Despite the consistent findings, which might provide an overview of the incubation activities in the Emilia-Romagna region, the research has some limitations.

Firstly, just a percentage of the total incubators was used for the analysis. Although the sample was typical of the population and even if the response rate was quite high, different, and more accurate results may have been obtained with a greater response rate. The study of the Emilia-Romagna system offers a clear view of what is going on within the region and, thanks to the comparison analysis with the rest of Italy, it was also possible to compare the system of Emilia-Romagna with the rest of the nation. However, no research has been conducted to study where Emilia-Romagna fits within an European or extra-European context.

The study is also constrained by the temporal landscape. The analyses were made considering only data on incubators in Emilia-Romagna dating back to the years 2018

and 2021, providing no information on how the industry in Emilia-Romagna has changed over time.

Moreover, start-ups analysis only shows the success of start-ups and their measure in absolute terms, without making any comparisons to start-ups outside of incubators. In this manner the advantage that incubators provide to the start-ups they host is hardly highlighted.

These restrictions also present a chance for more study.

The study can serve as the foundation for a comparison between the organizations that support entrepreneurship in Emilia-Romagna and those from other area of Europe or the world. This would make it possible to comprehend the sector's situation in Emilia-Romagna relative not only to the rest of Italy but also to other regions of different nations.

Also, more information on the subjects covered in this report could be add. of course, there is much more information about organizations supporting entrepreneurship that can be discussed and analyzed.

For instance, this study examined the fundings received by start-ups in incubators.

It could be worthwhile to investigate who the actors are that are providing this financing. Or even better, determine whether incubators working in various industries are defined by varying performances and traits.

Also, more research should be done on how the social and political environment may affect the capabilities and characteristics of incubators, such as a thorough examination of potential distinctions between incubators in the northern and southern hemispheres. Furthermore, it could be interested to see, even at the regional level, how the incubators divide into business, mixed and social incubators. Delving deeper into this topic, one could analyze the differences in the incubation programs offered by different types of organizations

Finally, it would be important to conduct a study to track what happens to startups in the region after the incubation period, comparing the result with the startups that didn't take part at any incubation program.

6. Appendix A

Incubators and Accelerators in Emilia-Romagna:

questionnaire for an analysis of the regional system

For all answers consider **2020 data**. If other activities are also conducted in your organization, please refer only to the incubation/acceleration activity.

What is the name of the entity managing the incubation/acceleration activities?	

What is your legal form?	

In case of investee companies (consortia), give the names of the partners	
0 1	

Does your organization have multiple	
locations or operate multiple	
incubation/acceleration spaces and facilities,	
including third parties?	
If yes, which ones?	

PART 1

NOTE: The following questions are extracted from the questionnaire sent to you in recent weeks by Social Innovator Monitor for the Report on the Impact of Italian Incubators and Accelerators. In case you have already answered the previous questionnaire, you do **not** need to answer the questions in this section (Part 1): **you can go directly to Part 2**.

Master information

What is the year of establishment of the incubator/accelerator?	
What was the average number of employees (FTE) in 2020? (refer throughout the questionnaire only to incubation/acceleration activities)	

How many square meters do you have available for the activities of	
incubation/acceleration?	

Companies

Do you charge a participation fee to access your incubation/acceleration programs?	 Always For some incubation/acceleration programs. Never
Do you charge a percentage of equity to access your incubation/acceleration programs?	 Always For some incubation/acceleration programs. Never

How many incubation/acceleration requests did you receive in total in 2020?	
How many entrepreneurial teams ²⁰ , of organizations ²¹ or startups have you incubated/accelerated in 2020? (considering any existing teams and organizations that you have continued to support in 2020 and new 2020 entrants)	

How are incubator/accelerator revenues divided as a percentage?

Please allocate the revenue proportionally to the commitment on the following activities so that the total makes 100%

	Cost item	%
a	Rentals	
b	Revenues from the provision of services to entrepreneurial teams and supported organizations	
c	Revenues from investments in supported enterprises (e.g., from having equity - dividends - or from selling equity - exits)	

²⁰ Entrepreneurial teams are defined as business ideas and projects that do not yet have a legal entity.

²¹ Organizations are defined as legal entities established as for-profit, hybrid, and nonprofit.

d	Other income	
	For example, revenues related to: Science park management activities; Paid scouting and open innovation activities for Corporate Companies and/or other entities; Paid training for third parties (non-incubated/accelerated); Paid consulting for public entities, SMEs and large enterprises; Coworking activities	
e	Grants and funding or co-funding from local, national and international calls for proposals	
f	Donations	

Financing

What is the total amount of funding received by the entities you incubated/accelerated in 2020 (considering both equity investments, grants, public calls, etc.)?		
Did you take corporate shares - equity - of incubated companies in 2020?	Yes	No
If yes (multiple answer)		
For venture capital investment?	Yes	No
In exchange for benefits and services? (work for equity)	Yes	No

Activities

Do you offer (directly or indirectly) these services to entrepreneurial teams, startups, and incubated/accelerated organizations?

		No	Only to some	To many	To all
a	Management coaching (e.g., business plan writing, company formation, business model development, mentoring, marketing and sales support, internationalization)				
b	Physical spaces (including shared services)				
c	Entrepreneurial and management training				

d	Support in seeking financing (including help in dialogue with investors)		
e	Administrative, legal and judicial services		
f	Support in intellectual property management		
g	Support in developing relationships - networking (e.g. with research centers, universities, government agencies, companies and other incubated enterprises)		
h	Supporting technology development and scouting.		
i	Social impact assesment services		
1	Training/consulting on Business Ethics and Corporate Social Responsibility (CSR)		

PART 2

All recipients of this questionnaire are asked to respond to this section.

Structure

How many average square meters (sq. m.) were available for office use for each entrepreneurial team²² /startup at your incubator/accelerator in 2020?

How many total square meters (sq m) were available in 2020 at your incubator/accelerator for:

collective activities

Laboratories, or for product development or prototyping activities

Contracts and agreements

In 2020, did your incubator have active contracts and/or agreements with entities in the regional ecosystem (Technopoles, Network Laboratories, other incubators)?

 $\frac{\text{Ye}}{\text{s}}$ No

If yes, list the entities with which such contracts and/or agreements were active in 2020:

²² Entrepreneurial teams are defined as business ideas and projects that do not yet have a legal entity.

In 2020, had your incubator organized open innovation programs with private entities (companies)?	
If yes, with how many subjects were such programs implemented in 2020?	
Optional: List the entities with which such programs were implemented in 2020:	

In 2020, had your incubator participated in open innovation programs organized by other private entities (companies, foundations, etc.)?

If yes, with how many entities such contracts and/or agreements were active in 2020:

Optional: List the entities with which these contracts and/or agreements were active in 2020:

In 2020, did your incubator have structured relationships with incubators in other countries to facilitate the development of startup markets?

If yes, with how many parties were the relationships active in 2020:

Optional: Indicate those with whom these relationships were active in 2020:

Companies

For this section, please refer to the entrepreneurial teams and startups you supported in 2020; considering both existing ones that you continued to support in 2020 and new entrants in 2020.

Of the entrepreneurial/startup teams you incu	bated in 2020.			
How many in 2020 had registered offices in:	Emilia- Romagna	other regions	overseas	
How many by 2020 had benefited from Europe the like)?	ean funds (SME	Instrument and		
How many to 2020 are university spinoffs?				
how many in 2020 were registered as innovativ compared to the total startups you incubated i	ve startups unde n the same year'	r L221/2012 ?		
How many in 2020 had been in the incubator/a	ccelerator for n	nore than 2 years	\$?	

How many in 2020 had established international collaborations or achieved exports?	
What was the total number of patents submitted by the entrepreneurial teams and startups you supported in 2020?	

For entrepreneurial/startup teams incubated by you in 2020.					
indicate the average turnover in 2020					
State the 2020 average staff (Full Time Equivalent), including associates Lapsy is composed of two Italian men, I believe both graduated					
State the staffing percentage in 2020:	graduate	female	youth	foreigner	

Policy

Have you received public funding (including EU-funded projects) directed to support incubated or accelerated startups/teams during 2020?					No	
If yes						
How were the amounts of funding received divided as a percentage between:	provincial	regional	national	internation al		

Tips

Indicate possible policies/measures that could be introduced by the Emilia-Romagna Region to foster the growth and sustainability of the region's incubator/accelerator system - max. 300 words

Indicate possible other initiatives to be implemented at the regional level (e.g., by the in-ER network) for the benefit of all incubators in the region and the startups they support- **max. 300 words**

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