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**From Potential to Performance: How  
Ecosystem Conditions Shape the Scalability of  
Italian AI Startups**

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# Introduction

The phenomenon of innovative startups has been involving all the major global economies, attracted by a new way of “doing business,” which has proved decisive in increasing productivity, promoting technological progress and attracting human and financial capital. By questioning the status quo, startups act as the driving forces behind industrial transformation and embody what Schumpeter (1950) described as “creative destruction”. At the same time, uncertainty remains a defining feature of startups: when the product or service offered is completely new, market reaction cannot be predicted with certainty (Sommer, Loch, Dong, 2009). Especially, innovation is not the result derived by just one player but rather is the result of the interaction between all actors in the ecosystem as a source of new organizational plans (Ranga, Etzkowitz, 2015). The performance and success of startups are therefore closely tied to the characteristics of the ecosystem in which they perform, and this results as particularly critical in areas of high innovation (Ranga, Etzkowitz, 2015).

In this landscape, artificial intelligence (AI) emerges as a pivotal sector. AI is transforming production processes, business models, and entire industries, whereas its adoption has become a key driver of competitiveness worldwide. The recent spread of Large Language Models has accelerated this trend, positioning AI startups as a vital frontier of innovation. Nevertheless, while they embody the disruptive potential of technological change, they also face amplified challenges due to their complexity, the need for specialised expertise, and the resource-intensive nature of AI development. Therefore, understanding how ecosystem determinants influence their growth is crucial both for academic research and for the design of effective policy measures.

The literature review highlights the contribution of innovative startups to economic growth, by fostering job creation and technological progress (Matricano, 2020; Isenberg, 2011). Nevertheless, their development is neither linear nor guaranteed, as they often face challenges that threaten their survival. Among the most pressing constraints, financial ones are the most complex, with limited access to adequate funding at all stages of development (Salamzadeh, 2015). Moreover, access to human capital, particularly in highly technological sectors, represents another critical factor, as founders must build teams with specialised expertise to successfully develop and scale their products (Salamzadeh, 2014; 2015). In Europe, an

additional obstacle arises from the fragmented regulatory environment, forcing startups to deal with diverse legal, tax, and administrative frameworks, often discouraging cross-border expansion within the European Union itself.

The thesis aims to analyse the Italian AI startup ecosystem, paying particular attention to the factors that influence the scalability of startups in this sector. The research question is *How do ecosystem-level enablers and constraints interact to influence the scalability of AI startups in Italy?* The working hypothesis underpinning the research is that the scalability of Italian startups, particularly in the AI sector, is not influenced by isolated factors but by the interaction of multiple ecosystem-level constraints and enablers. Particularly, access to capital, availability of human capital, ecosystem connectedness, support mechanisms and the regulatory environment are expected to influence the scalability of AI startups in Italy. The study will try to uncover new enabling or constraining factors rising from interviews with AI startup founders or members, allowing the identification of dynamics not entirely captured in the existing literature.

Italy is chosen as the case study because its startup ecosystem remains underdeveloped compared to other European economies. The gap is even more evident in innovative sectors like artificial intelligence. Indeed, Italy underperforms in key indicators such as R&D expenditure, venture capital availability, and the limited presence of specialised support mechanisms clearly shows how the country lags behind in this strategic field (European Commission, 2023). These structural shortcomings make Italy a compelling case to examine the obstacles and enablers faced by AI startups. Moreover, beyond the indicators published in European reports, academic literature on the Italian startup ecosystem remains scarce. For this reason, this thesis seeks to fill this gap by exploring whether there are novel elements or emerging dynamics distinctive to the Italian ecosystem.

To address the research question, the thesis adopts a qualitative research design, using a single case study methodology with Italy as the selected case. This allows for an in-depth exploration of perceptions, experiences, and mechanisms that would be hardly captured by a quantitative approach. As part of the empirical analysis, eight semi-structured interviews were conducted. Interviews have been designed to discover both systemic and context-specific factors influencing scalability. Six of these were held with Italian AI startups, namely *Pointout*, *Lexhero*, *ASC27*, *MrCall*, *Brandplane*, and *The Nettuniani*, selected to reflect diversity in terms

of size, stage of development, and application domains. In addition, one interview was conducted with *Innovup*, the association representing the Italian innovation ecosystem, and a final interview was held with the *Italian Tech Alliance*, whose objective is to promote the development of Italian technology companies and those who invest in them. This methodological design ensures a nuanced exploration of the challenges and opportunities encountered by ecosystem actors directly engaged in the field.

The thesis is structured in three chapters. The first one presents the literature review, outlining the main theoretical evidence on startups and entrepreneurial ecosystems, with a focus on the specific challenges relevant to AI startups. It ends with a regional analysis of the regulatory framework for innovative startups in Italy and the EU. The second chapter explains the research design, specifying the variables and the working hypothesis derived from the literature. It also details the qualitative methodology, including the data collection and treatment of the eight semi-structured interviews. The last chapter constitutes the empirical core of the thesis. It first analyses the material collected through the interviews to examine the key variables shaping the Italian AI startup ecosystem and their interactions. The second section shifts to the discussion, linking the empirical evidence with the broader theoretical and policy framework. Through this double structure, analysis and discussion, it gives a comprehensive insight of the Italian AI startup ecosystem, highlighting both the systemic weaknesses and the opportunities for renewal.

Preliminary findings show how the Italian AI startup ecosystem is characterized by persistent structural barriers, differentiating it from more mature ecosystems. Indeed, startups face chronic constraints such as limited venture capital, risk aversion among investors, low specialization in digital skills, weak technology transfer, and regulatory fragmentation. Moreover, the research highlights some new elements that did not emerge from the literature, allowing to explain the constrained scalability of Italian AI startups. Among these factors it is crucial to analyse the pivotal role of CDP Venture Capital as an ecosystem builder, the growing institutionalization of equity crowdfunding as a new financing method for startups, the lack of a unified governance framework, and the consequences of demographic trends on entrepreneurial renewal. Through these context-specific dynamics, the thesis contributes to a more nuanced understanding of the Italian startup ecosystem and offers insights for academic debate and policy design.



# Chapter 1 – Literature review

## 1.1 Introduction

The phenomenon of innovative startups has been involving all the major global economies, attracted by a new way of “doing business,” which has proved decisive in increasing productivity and employment in the territory, promoting technological progress and attracting human and financial capital. The ability of innovative startups to bring new ideas into markets, disrupt established industries and expand rapidly has attracted the attention of scholars, policymakers and investors. However, startups do not operate in isolation: their success is closely linked to the ecosystem in which they perform. Understanding the specific characteristics of national startup ecosystems is therefore essential to understand how entrepreneurial ventures emerge, evolve, and succeed, especially in high-potential sectors such as artificial intelligence (AI).

This first chapter provides an extensive literature review on the nature of startups, their lifecycle, and the elements necessary to define a thriving startup ecosystem. The goal is to map the primary theories, conceptual models, and key determinants that influence the creation and growth of startups, both in general and in the specific case of AI-driven ventures. Furthermore, the chapter provides a regional analysis of the European Union (EU) innovative startup framework, examining how the EU has gradually shaped its startup ecosystem through strategic policy initiatives, funding instruments, and regulatory innovations. From Horizon Europe to the Digital Decade strategy and the recent AI Act, the Union has actively sought to cultivate an innovation-friendly environment for startups to thrive and grow. Nevertheless, the EU's ecosystem remains fragmented, and not all member states can benefit equally from EU-wide initiatives.

Ultimately, the chapter delves into the Italian case, which serves as the empirical basis for the whole thesis. Italy presents a compelling paradox: despite a vibrant pool of talent, a growing number of innovative startups, and a gradually maturing legislative framework, starting from the 2012 *Startup Act* to more recent legislation such as the *Smart&Start*, the country keeps underperforming in scaling high-potential ventures. The review examines how the Italian legal

and policy framework has evolved to support innovative entrepreneurship, outlining structural barriers, including insufficient venture capital, red tape, and regional disparities.

## 1.2 History of Artificial Intelligence

In just a few decades, artificial intelligence has shifted from the sphere of science fiction to a substantial force influencing nearly every aspect of contemporary life, redefining the limits of machine capabilities (Darrell M. West, 2018). Scholars refer to AI as the development of computer systems to perform tasks typical of human intelligence, i.e., visual perception, speech recognition and decision-making (Britannica, 2025)<sup>1</sup>. The recent Artificial Intelligence Act of the European Union provided another definition of “AI Systems”, defining them as machine-based systems designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments<sup>2</sup>.

Although people might think that studies on AI began not long ago, Alan Turing is often recognized as the pioneer of the concept since he theorized in 1950 about “thinking machines” capable of reasoning like humans (Turing, 1950). His “Turing Test” stated that computers must complete reasoning tasks at a level comparable to humans to be considered “thinking” in an independent manner (Turing, 1950). Later, starting from Turing’s ideas, McCarthy was the first to introduce the term “artificial intelligence” to describe the field focused on creating intelligent machines, particularly software. According to him, this field is connected to the related challenge of employing computers to comprehend human intelligence (McCarthy, 1969). The issue was that it was not possible to define what types of computational processes can be classified as intelligent since it was not feasible to explicate certain aspects of human intelligence's mechanisms either (McCarthy, 1969).

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<sup>1</sup> Full citation available at the following website: <https://www.britannica.com/technology/artificial-intelligence/Is-artificial-general-intelligence-AGI-possible> .

<sup>2</sup> Regulation (EU) No 2024/1689 of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). Available at: <https://eur-lex.europa.eu/eli/reg/2024/1689/oj/eng> .

The difficulties to determine which computational operations are reflecting human intelligence became evident with the development of the first AI machines. The first wave of artificial intelligence proposed a “Symbolic AI” system oriented to the creation of computers able to mimic the problem-solving skills of a human brain (Smolensky, 1987). Despite a common enthusiasm for artificial intelligence machines, “Symbolic AI” failed. It became evident that many fields or domains cannot be precisely formalized in rules and symbolic manipulation (i.e. language). This first attempt with AI originated lot of criticisms. According to Hubert Dreyfus (1972), “Symbolic AI” failed because of philosophical assumptions that compared the brain to a computer (Kenaw, 2008). He argued that the brain does not perform like a computer executing separate tasks, nor does the mind in handling information solely based on conventional principles. He also questioned the possibility that all knowledge can be completely articulated in logical or mathematical formats (Kenaw, 2008).

After an AI winter, a second effort to improve this sector arrived with the “Connectionist AI”, following the idea that machines should simulate neural networks<sup>3</sup> (Hardesty, 2017), drawing inspiration from the brain structures and functions, instead of human reasoning and logic as the “Symbolic AI” unsuccessfully did (Smolensky, 1987). This new kind of technology was more likely to succeed, being data-driven and capable of learning from examples rather than being rule-based. This earliest application of “Connectionist AI” aimed at picturing intelligence through networks of simple processing units. In contrast to “Symbolic AI”, which utilized explicit rules, it relied on probabilistic models, enabling it to learn and adjust by forming new associations among its components (Smolensky, 1987). Nevertheless, its single-layer structure was restricted to recognizing only linearly separable patterns, a limitation that was afterwards overcome with the advent of multi-layer neural networks. His findings demonstrate the capabilities of multi-layer neural networks<sup>4</sup> (deep neural networks), which can learn intricate, non-linear patterns and directly derive hierarchical features from raw data.

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<sup>3</sup> Neural nets are a means of doing machine learning, in which a computer learns to perform some task by analyzing training examples. Usually, the examples have been hand-labeled in advance”. Retrieved from: <https://news.mit.edu/2017/explained-neural-networks-deep-learning-0414>

<sup>4</sup> Definition: “a multilayer neural network has multiple layers stacked on top of each other. Each layer receives input from the previous layer and applies a mathematical operation called an activation function, such as the sigmoid function. This allows the network to capture complex relationships between inputs and outputs”. Retrieved from: <https://muneebsa.medium.com/deep-learning-101-lesson-9-multi-layer-neural-network-7cd3a53066c8> .

Contemporary AI has progressed even more. Currently, it can give the appearance of intelligent behaviour because it operates through algorithms<sup>5</sup> and statistical learning techniques on extensive datasets (Neapolitan, 2012). That way, by using statistical associations found in the training data to obtain a sort of implicit model, it is simpler to produce the desired behaviour. A concrete advancement is expressed by Large Language Models (LLMs), which produce text that mimics human writing and supports various tasks (Blank, 2023).

### 1.3 Startups

Nowadays, national economies are in perpetual evolution. They are constantly expanding on a global scale, and startups are one of the most important driving forces behind this phenomenon. Startups are not to be confused with any other traditional business operating and trying to succeed in each market. The broad research undertaken on the subject generally considers a startup as a business venture attempting to offer to the market a completely new product or service, whereas a traditional business follows an already established design (Eisenmann, 2021). To put it differently, a startup is a novel business venture that is always constructed upon an innovative idea. Consequently, startups perform a pivotal role in nurturing innovation, driving progress, attracting investments, and enhancing competition. They are typically founded by entrepreneurs aiming to develop innovative products, services or business models (Mehmeti and Musabelli, 2024).

With an innate capability to identify gaps in existing markets, startups take on the challenge of transforming traditional practices and providing solutions that are not only effective, but also entirely new. Their willingness to question the status quo makes them the driving forces behind industry evolution, therefore being the embodiment of what Schumpeter referred to as the “creative destruction” (Schumpeter, 1950). Traditional industries often come with established players and rigid structures. Startups, on the other hand, thrive on disruption. They challenge preexisting beliefs and are willing to operate quickly based on market feedback. This

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<sup>5</sup> Definition: “a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem”. Retrieved from: <https://dictionary.cambridge.org/dictionary/english/algorithm>

willingness to adapt gives startups a unique advantage, allowing them to respond to changing consumer demands and preferences (Mehmeti and Musabelli, 2024).

As Salamzadeh (2015) argues, entrepreneurship theories on startups fall into two categories: (i) macro level theories (e.g. see, Schumpeter's theory (Schumpeter, 1934), population ecology (Hannan and Freeman, 1977)), and (ii) micro and meso level theories (see e.g. Vesper, 1990; Lim et al., 2008; Bhaves, 1994; Veciana, 1988; Deakins and Whittam, 2000; Núñez, 2007; Serarols, 2008; Samuelsson and Davidsson, 2009). Salamzahed and Kawamorita Kesim (2015) define startups in three areas: organization, management, entrepreneurship. They defined a startup company as newly born companies which struggle for existence. Giardino, et all. (2016) described a newly type of startup named software startups. This type of company is defined as organizations focused on the development of high-tech and innovative products, with little or no operating history, aiming to robustly grow their business in extremely scalable markets.

S. Blank (2013), who so far has contributed the most to the systematizing of knowledge about the discussed area, pays especial attention to understanding the 'startup' term. This activity is not meant to imitate large firm. It is a temporary institution seeking a profitable, measurable and also repeatable business model. At an early stage of its activity development the organization bases primarily on suppositions and ideas, without the customer background and usually even a possibility of market analysis due to the uniqueness of its branch. S. Blank distinguished two sorts of startups: scalable startups and startups for sale. The founder is confident that his idea will conquer the world, and he would become a billionaire. At first, he hopes to find a business model, which should be measurable and repeatable. Due to the necessity of raising considerable funds, he chooses Israel, Silicon Valley, New York or some other large centres with technological background. This group of initiators constitutes a relatively small part of startup creators, nevertheless, they are able to draw considerable attention of investors and press accumulating a risky capital. The other type are startups created for sale. These are companies basing on creating applications by means of the least possible financial input. The founders count on the sale of their startups to bigger firms. A company buying a startup not only absorbs the idea but also the people working on it (Blank, Dorf, 2013).

One distinctive feature is the high uncertainty in which the startup ventures operate. As long as the product or service being offered is completely new and unknown, you never know for sure how the market will react (Sommer, Loch, Dong, 2009). Startup type usually pass through two

phases of development, which are the experimental phase and the production phase. Today about 90 percent of startups fail and do not pass the experimental stage<sup>6</sup>. World experience shows that startups need support during the first experimental phase and this support is known as the “startup ecosystem”. Such ecosystems operate with clear legal and regulatory frameworks, with various partners and collaborators, with the participation of public and private actors, as well as with incentives for promoting the right environment for the establishment and development of startup ventures. The concept of ecosystem in economics and business is borrowed from ecology and the earliest definition of a business ecosystem was given by Moore (1993, 1996). According to him, a business ecosystem enables enterprises to “absorb resources of all kinds, attract capital, partners, suppliers and customers to build networks of cooperation” (Moore, 1993).

More innovative countries tend to have a more favourable environment for entrepreneurship and for the development of innovative startups, which are often at the forefront of AI adoption and use (Makridakis, 2017). Therefore, innovation and AI development are interdependent factors, where innovation can lead to AI development and vice versa. The presence of a favourable technology ecosystem and business environment can foster the development of both, helping to create a virtuous circle of innovation and economic growth. To better understand the relationship between innovation and AI development, it is important to consider some key factors that influence both. This means that businesses must have access to adequate funding, infrastructure and support services, as well as a culture of innovation and collaboration (Ziakis et al., 2022). At the same time, startups promote innovation, speed up institutional change, and boost productivity by introducing new products to the market.

### **1.3.1 Startup lifecycle**

Research on startups’ lifecycle is well-developed in last few years (Salamzadeh, 2015). Since the sequence of stages might vary among different startups, a holistic perspective is presented to offer a better understanding of the lifecycle of startups. The stages are as follows:

1. Bootstrapping stage

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<sup>6</sup> Startup Genome “Global Startup Ecosystem Report 2024”. Available at <https://startupgenome.com/article/the-state-of-the-global-startup-economy> .

In this very early stage, the entrepreneur initiates a set of activities to turn his idea into a profitable business. The purpose of this stage is to position the venture for growth by demonstrating product feasibility, cashmanagement capability, team building and management, and customer acceptance (Brush et. al., 2006).

## 2. Seed stage

For most startups the seed stage is highly uncertain (Salamzadeh, 2015). The seed stage is characterized by the initial capital that is used to make the product or service (Manchanda, Muralidharan, 2014). Thus, founder seeks for support mechanisms such as accelerators, incubators, and small business development centres to accelerate the procedure. A great number of startups fail in this stage since they could not find adequate support mechanisms. On the other hand, those who succeed in receiving support would have a higher chance of becoming profitable companies.

## 3. Creation stage

Creation stage occurs when the company sells its products, enters market, and hires first employees (Salamzadeh, 2015). Some scholars believe that entrepreneurship stops when the creation stage is ended (Ogorelc, 1999). This supports the argument that startup theories are borrowed from entrepreneurship theories and not management and organization theories. At the end of this stage, the organization/firm is formed, and corporate finance is considered as the main choice for financing the firm. Venture capitals could facilitate the creation stage, by funding the venture.

### **1.3.2 Innovative startups**

The startup universe does not fully coincide with the share of startups (officially) innovative. This is because 'innovative startup' is a status that entitles to a series of tax benefits and therefore many companies register as such even if they perform traditional and non-innovative activities. By focusing on the notion of innovative startup, the prospects in terms of increased productivity, economic growth, and creation of job opportunities change greatly. It has been shown how startups born primarily to bring a form of innovation are more likely to survive and perform better. The authors of the study (Cefis, 2005) were able to show that being an innovative company increases survival possibilities by 11 percent more than its non-innovative counterpart. In sum, the idea that innovation propensity is settled as a driver of growth, and more specifically as a good predictor of the likelihood of survival and above-average

performance in terms of profitability, exports, and job creation (Colombelli et al., 2016) is well established.

Innovative startups together with other actors constitute the main sources of economic development. Studies have been conducted highlighting the dependence of economic growth on the presence of innovative businesses (Matricano, 2020). With their positive influence on employment and growth, innovative startups become valuable organisms for governments and all actors in the innovation fabric to cultivate and monitor. Investing to incentivize innovative entrepreneurship is one of the tools that governments can use to generate more employment. It is not just welfare that is the outcome; there is also a considerable return in the form of taxes that can be re-used to support the innovation ecosystem (Isenberg, 2011).

According to the *Global Startup Ecosystem Report 2024* published by Startup Genome, the fastest growing innovative industry has been the Deep Tech from 2018. This includes Advanced Manufacturing & Robotics, Blockchain, Agriculture Tech (Agtech) & New Food and, AI & Big Data. Then, Fintech sector follows also at a fast pace. The explosive growth of the AI markets is fuelled by numerous startups, many of which have achieved the prestigious status of unicorn<sup>7</sup> in 2023. Pushed by the raise of Large Language Models, the sector is accelerating its growth. According to CB Insights, these startups are making progress considerable, achieving valuations of more than one billion dollars in a time significantly lower than most of their competitors. In the field of generative AI, the average time needed to reach a valuation of one billion dollars is only 3.6 years, well below the average of 7 years of other unicorn farms (McKinsey & Company, 2024).

### **1.3.3 Challenges of startups**

Prior research on the challenges experienced by startups identifies several common issues across different ventures (Shepherd et al., 2000). However, most of the challenges are unique to each startup, and their impact varies greatly. Financial challenges are the most common ones. As mentioned earlier, finance is an essential part of the startup growth process. Any startup faces financial issues and problems for multiple reasons and in different stages (Salamzadeh,

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<sup>7</sup> The term was first used by Aileen Lee and it is referred to a privately-owned startup business worth more than \$1 billion.

2015). For instance, during bootstrapping the founder negotiates with family members and friends to convince them to invest in his/her idea. Afterwards, in the seed stage, founders should look for angel investors and convince him/her with reasonable valuation plans. Next, in the creation stage, the founder should draw up a plan to take advantage of venture capital. Moreover, the lack of financing often forces promising startups to relocate to better equipped and more accessible markets.

A second challenge is represented by human capital accessibility. Startups normally start with one founder and some cofounders. As time goes by, founder needs more experts to develop the prototype. Then, he/she has to negotiate with people, make team and finally hire employees. This process is so critical to succeed and if the founder lacks enough knowledge of the field, the startup might fail due to human resource management issues (Salamzadeh, 2015; Salamzadeh, 2014). Compared globally, the EU is an important hub of STEM talents (Science, Technology, Engineering, Mathematics), with around 19 million professionals, accounting for approximately 5.5% of its labour market. Despite this, Europe's startup ecosystem still faces talent shortages, including a severe lack of digital skills.

Third, the regulatory environment might be a huge obstacle for startups. In EU, the lack of harmonisation across Member States creates inefficiencies, making it difficult for young and innovative startups to expand beyond their domestic market and often leads to a preference for larger non-EU markets. The EU's fragmented regulatory environment forces startups to navigate different legal, tax, and administrative frameworks in each country. Furthermore, support mechanisms play a significant role in the lifecycle of startups. These support mechanisms can include incubators, accelerators, small business development centres, hubs for innovation. They are crucial to reduce the uncertainty typical of early-stage innovation, offering infrastructure, mentorship, and strategic guidance. Lack of access to such support mechanisms increases the risk of failure (Salamzadeh, 2015 a, b).

Lastly, the connectedness of the ecosystem allows to understand the quality of relationships within the startup ecosystem, including ties with other entrepreneurs, mentors, research institutions, and large corporations. A lack of embeddedness in dense innovation networks hinders learning opportunities and internationalization capacity. While a supportive environment facilitates the success of startups, a maleficent one could result in failure (Boeker, 1988).

## **1.4 Startup entrepreneurial ecosystem determinants**

### **1.4.1 The Triple and Quadruple Helix Model**

Innovation is not the result derived by just one institutional player, such as universities or industries, but rather is the result of the interaction between all actors in the ecosystem as a source of new organizational plans (Ranga, Etzkowitz, 2015). At the heart of this shift is the triple helix model, which was presented about two decades ago (Etzkowitz, 2003). At its core, it claims a new institutional foundation for the development of innovation, which is no longer produced by a single institution, but instead by the triadic networking between the academic community, industry, and the government (Ranga, Miedema, Jorna, 2008). The main correlation between the three institutional factors in the triple helix model are the following: technology transfer, co-operation and conflict resolution, collaborative leadership, substitution of certain functions, and networking. Technological transfer is particularly important in areas of high innovation (Ranga, Etzkowitz, 2015).

A key component of the triple helix model is the conflict management between the different roles of the three key institutional factors. These conflicts concern both the individual tasks and functions, as well as the interpersonal relationships developed between them. The role of the State in this case is exceptionally important, in particular in terms of monitoring the links between education and industry, as well as in developing networks of co-operation and exchange of good business practices. In this respect, some variations have been suggested in recent years in order to integrate additional variables that affect collaboration between public organizations, the academic community, and the business world.

Some researchers proposed the quadruple helix model, which, in addition to the three key institutional bodies, also takes into account the role of culture, civil society, and the mass media (Carayannis, Campbell, 2006). The quadruple helix model is characterized by a high degree of sensitivity to the impact of the knowledge that society and democratic fermentations are taking place on a global scale, while recognizing the relevance of the environmental framework of society and the economy. This model refers to an ecosystem in which all the actors involved work together in a coordinated way.

Afterwards, entrepreneurial ecosystems have arisen as a widespread concept to explain the existence of high-growth entrepreneurship within regions, focusing on the combination of environmental factors that play a role in influencing people's willingness and ability to undertake entrepreneurial activities and encouraging the startup process. Startup ecosystems is a subset of the broader entrepreneurial ecosystem. It is the union of localized cultural outlooks, social networks, investment capital, universities, and active economic policies that create environments supportive of innovation-based business (Spigel, 2017). Particularly in the case of startup businesses that are characterized by a high degree of technological innovation and service provision at a global level, the need for interconnection with other ecosystem actors is even more important (Unger et al., 2011).

### **1.4.2 Components for the sustainability of a startup ecosystem**

When describing an entrepreneurial ecosystem, scholars refer to "a set of interdependent factors and actors, coordinated in such a way as to activate a productive entrepreneurship within a particular territory" (Erik Stam & Ben Spigel, 2016). It is reasonable to think that the great complexity and specificity of the interactions and synergies that characterize each entrepreneurial ecosystem, in addition to the multitude of endogenous and exogenous factors that make them up, inevitably makes them unique (C. Mason & R. Brown, 2014). Nevertheless, as shown previously, researchers have tried to formulate standardised models which, for convenience, could give a clear and coherent representation of a generic ecosystem.

In 2011, Isenberg developed a model in which he observed that all ecosystems capable of generating a self-sufficient entrepreneurial activity, responsible for the creation of socio-economic value, were united by the presence of several elements and stakeholders. Studies following the model proposed by Isenberg in 2011 have explored the issue of the factors responsible for creating a successful entrepreneurial ecosystem on a given territory. Among these, *Startup Communities* by Brad Feld (2012) focused on the role of the different actors involved and the resources they use, identifying a list of nine attributes that seem to overlap in part with the elements identified by Isenberg. Similarly, in 2013, the *World Economic Forum* formulated eight pillars for the development of a successful ecosystem, similar to the domains presented by Isenberg, each associated with its specific components.

All the updates and in-depth studies of the concepts proposed by Isenberg have made it possible to enrich the literature on entrepreneurial ecosystems. Consequently, it is possible to affirm that the factors affecting the sustainability of a startup ecosystem, placed in a broader entrepreneurial ecosystem, depends on a combination of interrelated determinants: accessibility to high-quality educational institutions, availability of human capital, financial resources, role of the state and regulatory environment, presence of support mechanisms such as incubators or accelerators, and the connectedness of the whole ecosystem.

First of all, higher education institutions and, especially, universities play a well-established role as key agents in creating and promoting regional economic growth and competitiveness (Lehmann et al., 2020). Educational institutions have the capacity to activate the promotion of the enterprise creation process. These institutions are particularly important in the early stages of the life cycle of startups and new enterprises, collaborating to build specific skills and providing, through incubation and acceleration, a range of resources useful to their initial development, such as infrastructure, support activities, mentorship and specialisation programmes that promote the growth of young entrepreneurs and emerging startups.

Another crucial element for the well-functioning of the startup ecosystem is represented by human capital (Østergaard, Marinova, 2018). The term human capital is used to reflect the stock of knowledge, experience, and personality attributes exemplified in the capacity to work in order to create economic value. Since Smith (1776) took consideration to human capital as an asset of economic value, scholars have focused on the economic effects of human capital. In 1931, Schumpeter called for a focus on the individual entrepreneur or the creative destructor with his/her motives, wishes, aspirations and activities when dealing with entrepreneurship and entrepreneurs.

The third fundamental factor is represented by the financing of startups, which is a matter of particular research interest, as new innovative companies often struggle in raising funds while having limited cash flows in their early stages. The problem of finding funding is one of the most important difficulties facing startups (Löfsten, Lindelöf, 2003). Financing is a crucial factor not only in the early phases of operation, but it greatly affects the profit of a startup business (Stucki, 2014). Venture capital has the most significant impact on the development of innovative entrepreneurship over any other form of financing (Hsu, 2004). These affect the

startups through two key mechanisms: firstly, directly through the provision of finance and human capital and, secondly, indirectly by providing access to further financing institutes, thus assuming a mediating role (Pratch, 2005). In addition, the benefits of venture capital financing are multiple, as venture capital firms provide startups with human capital with upgraded management and management skills, experience, and expertise. Another major source of funding for startups are angel investors, individuals who provide capital but also nonfinancial resources, such as knowledge, experience, mentoring, and networking.

The fourth element is represented by the supportive role of the state in the broader ecosystem of entrepreneurship, and it has been argued that the state can be involved in some areas of high-risk activities where the private sector consistently avoids participating (Mazzucato, 2011). A typical example of these government interventions is the U.S., where many business ecosystems, such as Silicon Valley, benefit from the active role of the state. In the Silicon Valley case, government role in the financing sector contributes to the success of the ecosystem (Mowery, 1999). The interference of governments has to facilitate business activity and avoid hindering it. Government can act through tax incentives on R&D expenditures, they can contribute by highlighting successful business models, removing bureaucratic barriers to startups, and mitigating the social stigma of failure.

Another element is the business support and connectedness. The performance of startups is directly influenced by the quality of their networks and their ability to exploit the resources they have access to through these relationships. Startup networking capability facilitates the development of knowledge-intensive products, enabling them to globalize successfully (Walter et al., 2006).

The presence of large companies on the territory plays a major role in the development of an entrepreneurial ecosystem, especially in the case of peripheral regions distant from large urban centers. Isenberg himself points out in a 2013 article that "it would not be possible to create a thriving entrepreneurial ecosystem without the presence of large companies that cultivate it, intentionally or otherwise" (Isenberg, 2013).

Lastly, an important element is represented by the existence of organisations or individuals who decide to support, promote and encourage entrepreneurial activities in a specific geographical area. Among them, incubators have a particularly important role. An enterprise incubator can be defined as an organisation actively supporting the procedure of generating and developing

new innovative enterprises. This happens through a range of services and resources that can be offered either directly or via a network of partners. Incubators are typically public but often lead by private parties. They usually consist of a shared physical space, which seeks to provide the incubated companies with a strategic type of monitoring and support, aimed at creating value. The growth of the entrepreneurial ecosystem is therefore one of the main objectives of an incubator which, consequently, assumes a significant role its realization.

## **1.5 Regional analysis of AI startups: Europe, heating up but still facing challenges**

The United State (US) is without any doubts the most advanced country in the field of artificial intelligence, with numerous startups emerging in the famous Silicon Valley<sup>8</sup>. The extraordinary ability of these technologies to optimize efficiency and increase productivity has made AI a crucial strategic resource for the industrial and government in the US, contributing significantly to positioning the country in a leading position in the global race for AI innovation. There are few nations in the world that have as much investment strength as the US. The country is by far the place where the largest number of startup funding deals are concentrated. The US continues to dominate the market both in terms of share of deals and in terms of fundings (Song, 2023).

The only real competitor to the US is China, also equipped with enormous resources and supported by a concentrated state apparatus determined to achieve first place. China has also made the development of AI a priority and, through targeted state interventions and rapid innovation, the country has rapidly bridged the gap. If the US is leading the race for artificial intelligence, it is difficult to say whether it they will be able to maintain it indefinitely. It is imperative that the US exploit its advantages and continue to produce, recruit and develop skilled AI talent, foster an innovative atmosphere and encourage cooperation with like-minded nations. All of this should be supported by a clear regulatory framework that minimizes the harm to citizens and does not hinder the country's development.

As for Europe, however, it is a different matter. Undoubtedly compared to China and the US, Europe still lags behind, in terms of investment and development. Nevertheless, despite often being overshadowed by these two world powers, Europe still boasts an extremely vibrant

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<sup>8</sup> The global AI Index by Tortoise Media. Available at: <https://www.tortoisemedia.com/data/global-ai#rankings> .

environment. European companies and their reservoirs of knowledge possess a critical mass of technical expertise sufficient to compete globally. This is also shown by data on the EU funding in the field of artificial intelligence that, in the period 2014–2020, raised around 8 billion euro (Santos, 2024).

Policymakers in Europe are well aware that innovative startups may play a particularly important role for economic development, technological advancement and societal impact (Autio et al., 2014; Audretsch et al., 2006; Baumol and Strom, 2007). Thus, the European Union has taken a great stand in affirming its aim for achieving digital sovereignty<sup>9</sup> which would enable the Union to boost its capabilities in terms of promoting its strategic autonomy, but also through significantly updating its regulatory framework on areas such as AI, online platform regulation, data sharing or digital markets. The priorities set forward through the EU's Digital Decade (European Commission, 2021) plan also have a great emphasis on data governance, developing digital infrastructure and fostering technological uptake (Panait et al., 2021).

Taking a step back, in 2018, the European Commission adopted a communication to promote the development of AI in Europe, and published a coordinated plan on AI, endorsed by the Council of the European Union, to coordinate the EU Member States' national AI strategies. By the end of 2018 the High-Level Expert Group on Artificial Intelligence (AI HLEG) was established, which was tasked with preparing AI ethics guidelines, drafting AI policies and investment details. Soon after, in April 2019, the Commission published a set of non-binding Ethics guidelines for trustworthy AI (European Commission, 2019).

More recently, the European Commission published a white paper on AI discussing how the AI ecosystem reflects on citizens, businesses and services of public interest (European Commission, 2020). Additionally, the Commission proposed the first legal framework on AI, which addresses the risks of AI and positions Europe to play a leading role globally (European Parliament and European Council, 2021). As the EU is also a trend-setter for normative action, incentivizing other states to put forward legislative initiatives, the approach proposed in the recent EU AI Act (European Commission, 2024) creates “a new regulatory paradigm for

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<sup>9</sup> See Think Tank European Parliament. Digital sovereignty for Europe. (2020). Available at [https://www.europarl.europa.eu/thinktank/en/document/EPRS\\_BRI\(2020\)651992](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2020)651992).

innovation”. through pushing forward a risk-based approach for AI applications across various industries.

For what concerns specifically startups, the EU encourages the set-up of new companies through different initiatives. For instance, in January 2025, the European Commission presented the Competitiveness Compass, a new roadmap to re-establish Europe’s dynamism and boost our economic growth. It builds on the analysis put forward by the Draghi and Letta reports in 2024. Among the proposals, the Commission has identified five strategic levers: promote the birth and growth of startups, develop an efficient venture capital market, attract and retain talent, invest in technological infrastructure and stimulate research and innovation.

Furthermore, the European Commission has also launched a Startup and Scaleup Strategy, bearing in mind the Letta Report<sup>10</sup> on the future of the Single Market and the Draghi Report<sup>11</sup> on European competitiveness. “It is time to make the European Union the ultimate destination for innovation, empowering startups and scaleups to grow, scale, and succeed”<sup>12</sup>. The Strategy assumes that starting and scaling up innovative companies in Europe remains challenging. Shifting from lab to market, accessing capital and talents, market fragmentation, regional imbalances, are the biggest challenges that the EU aims to address. The goal is to create an innovation-friendly environment that makes it simpler and faster for European innovative startups to grow and scale up in the Single Market.

Another important signal was represented by the first ever Commissioner for Startups, Research and Innovation, promising to engage national finance ministers in dialogue to promote investment. Ekatarina Zaharieva affirms, during the confirmation hearing, that “Every startup moving to third countries to seek capital represents a waste of European resources, a loss of

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<sup>10</sup> Available at [https://single-market-economy.ec.europa.eu/news/enrico-lettas-report-future-single-market-2024-04-10\\_en](https://single-market-economy.ec.europa.eu/news/enrico-lettas-report-future-single-market-2024-04-10_en) .

<sup>11</sup> Available at [https://commission.europa.eu/topics/eu-competitiveness/draghi-report\\_en](https://commission.europa.eu/topics/eu-competitiveness/draghi-report_en) .

<sup>12</sup> Communication (EC) No 2025/270 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee Of The Regions, on the Startup and Scaleup Strategy. Choose Europe to Start and Scale. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025DC0270> .

European jobs and missed opportunities for our communities”. In the mission letter<sup>13</sup> Ursula von der Layen drafted for this occasion, it appears clear that Europe wants to relaunch its competitiveness by putting research and innovation, science and technology at the centre of our economy.

In that respect, the European Innovation Council (EIC) will need to be expanded to support disruptive innovation in strategic fields, and its rules need to be simplified. Indeed, the EIC was created to promote breakthrough innovation, and it has supported deep tech startups with grants and equity investments of up to EUR 30 million. Despite the EIC Fund has become one of Europe’s main deep tech investors in only four years, the demand from excellent deep tech companies for EIC support cannot currently be met<sup>14</sup>.

Moreover, increasing the supply of venture capital (VC) needs to be a major focus of policies that aim to support high-tech startups in Europe (European Commission 2016, 2021). Today, European institutional investors, including pension and insurance funds, play only a limited role in the European VC market. Between 2013 and 2023, pension funds accounted for only 7% of VC funding in the EU. Policies are motivated by the need to close the VC investment gap in Europe (Durufle et al., 2017; European Investment Bank, 2020). Indeed, European countries that tend to attract VC funding in general have become the main AI investment hubs, with the U.K. leading the group, France and Germany following suit, and the Nordics punching above its demographic weight.

Much as EU level strategic documents on AI are meant to lead the Union towards a more holistic approach on the subject, a number of unique national strategies have been developed independently by its member states. The heterogeneous set of new national initiatives that promote innovative startups offers the opportunity for a number of reflections on the nature of innovative entrepreneurship and the related policies (Audretsch et al., 2020). Through national Startup Acts, innovative startups could receive a broad range of benefits, from simplified administrative requirements to tax reliefs, passing from flexible contracts for employees, to the potential of raising capital through equity crowdfunding or accelerated liquidation procedures.

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<sup>13</sup> Available at [https://commission.europa.eu/document/download/130e9159-8616-4c29-9f61-04592557cf4c\\_en?filename=Mission%20letter%20-%20ZAHARIEVA.pdf](https://commission.europa.eu/document/download/130e9159-8616-4c29-9f61-04592557cf4c_en?filename=Mission%20letter%20-%20ZAHARIEVA.pdf) .

<sup>14</sup> Only 5.9% of applications to the EIC Accelerator were successful in the most recent cut-off (October 2024)

Given the acknowledged importance of new venture creation on innovation, employment and economic growth, it is not surprising that innovative startups have played a central role in policy agendas in recent years (Autio et al., 2014).

## **1.6 The Italian landscape for artificial intelligence startups**

### **1.6.1 The Italian framework for innovative startups**

Innovative startups promote a new entrepreneurial paradigm that promotes equity and social mobility, strengthens the link between universities and enterprises and is prone to cross-sectoral contamination and open innovation. To encourage growth and to fill the gap with the other EU Member States, specific measures aimed at supporting innovative startups and SMEs during their life cycle have been introduced in Italy. With the drafting of the *Restart, Italia!* Report in 2012, Italy showed the first signs of interest in innovative entrepreneurship, culminating with the creation of a real legislation in support of innovative startups and their ecosystem: the *Decreto Crescita 2.0*, or *Startup Act 2.0*. With the aim of improving the scalability of startups in Italy, legislation has undergone a series of changes and adaptations, dictated by the continuous monitoring of the results observed directly across the territory.

The *Italian Startup Act 2.0*, entered in force in 2012, was then modified in December 2024, with the *Scaleup Act*. It marks a turning point because, after 12 years of the Startup Act, it brings innovative entrepreneurship back to the centre of the political agenda, rationalizing the process of creation and development of new businesses and bringing institutional investors closer to the venture capital asset class, through tax incentives and benefits. According to the legislation, startup has to meet some objective requirements in order to be recognized as “innovative”. Above all, it has to be a new company, established for less than 5 years, with residence in Italy or in another Member State but with a production site or a subsidiary in Italy, with an annual turnover lower than 5 million euros and no profit distribution. It must not be listed in a regulated market, it must have innovative goods or services having a high technological value that represent its exclusive or prevailing core business and, it shall not result from a merger, de-merger or transfer of a business or a part thereof.

Such startups incorporated under the form of limited liability companies will be entitled with some benefits and tax incentives. First and foremost, there is the *de minimis* incentive for pre-

seed investors, which, under the Competition Law, will enjoy a higher tax deduction of up to 65%, up from the 50% previously provided for, and which can finally be used immediately by signing a SAFE. Not only that, but the deduction will not be lost in the event of a carryover or bankruptcy of the company before three years, and it will also be available through convertible financing, i.e., with a tax credit. After the third year, the benefit will drop to 30%, aligning with the standards for investments in innovative SMEs.

There is a long-awaited innovation in the *Scaleup Act*, that was still lacking in Italy, namely the possibility for pension funds and social security funds to invest a minimum mandatory percentage of their assets in venture capital fund managers authorized in Europe, provided that the underlying investment is channelled through Italy. This means that investment volumes will finally grow, breaking the traditional conservatism of managers and ensuring that Italian startups can count on investments accessible to competitors based in other countries. This measure was introduced in the Competition Bill through a specific amendment whereby pension funds, in order to maintain tax exemptions, will allocate at least 5% of their portfolio to venture capital funds by 2025, a figure that will rise to 10% from 2026.

Moreover, among the main instruments in support of startups and scaleups, the set-up of the Cassa Depositi e Prestiti (CDP) Venture Capital Sgr, in 2020, represents an important milestone. CDP Venture Capital is the largest venture capital operator in Italy and one of the leading in Europe. It is an Italian initiative aimed at encouraging entrepreneurial ecosystem and boost innovation in Italy. It aims at increasing the power of venture capital for the economic development of the country encouraging direct and indirect investments in startups during each stage of their life cycle, managing existing funds and promoting new ones. The asset management company is owned 70% by CDP and 30% by Invitalia. It deals with 2,048 million of asset under management, in which it invests through 12 operating funds.

Lastly, in terms of AI regulation, the Italian Parliament has just approved the legislation concerning government provisions and delegations in the field of artificial intelligence. The provision, which is made up of 28 articles, aims at introducing national legislation, in harmony with the European regulatory framework, which prepares a system of governance principles and specific measures suitable for the Italian context to mitigate the risks and seize the opportunities of artificial intelligence. AI systems have to be based on the principles of

transparency, accountability, fairness and respect for fundamental rights, ensuring a balance between the opportunities that new technologies offer and the risks associated with their misuse.

## **1.6.2 The Italian ecosystem: data and characteristics**

To date, the Italian ecosystem is made up of almost 12.000 certified innovative startups<sup>15</sup>, recording a strong growth trend, testifying to the importance of the phenomenon and the great efforts supported at policy level. According to the *Report of the Osservatorio Cribis, 2024* marks a growth in innovative startups in Italy: the area with the highest concentration of innovative realities is the Northwest (35.1%), followed by Southern Italy and the islands (27.7%), the Center (20%) and the Northeast (17%). From the data, it can be observed that the Italian policy dedicated to innovative startups has, since 2012 and following its continuous evolution, contributed in an extremely significant way to the spread of the phenomenon throughout the national territory, leading to a substantial growth in the number of new innovative companies within our country, workers involved, and capital employed.

An important improvement was shown in the last report from 2023 of “*Tech Scaleup Italy*”, realized by *Mind the Bridge*<sup>16</sup>. About 100 new *scaleups* a year join the Italian technological landscape, resulting in an annual increase of 20% in staff. These companies are just the tip of the iceberg. Under the surface, about 10,000 startups that have not yet reached *scaleup* status are estimated to exist. Even if their contribution to GDP is probably still modest, they are relevant in terms of employment (the total number of employees is estimated at around 20-30,000, though not all full time) and for their entrepreneurial mentality. By looking at numbers, the 7.3 billion dollars invested in Italian *scaleups* already generate more than 4 billion dollars of turnover every year. This means that every dollar invested in Italian Venture Capital produces half a dollar of GDP per year (growing) and generates a return in less than 2 years. It therefore seems quite obvious that investing in the startup economy is not only safe, but also the only way forward.

Despite this increase may seem encouraging, it is still not sufficient to achieve the results achieved by many other countries in the world, where the startup phenomenon is deeply

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<sup>15</sup> Data available at <https://startup.registroimprese.it/isin/home> .

<sup>16</sup> Available at <https://mindthebridge.com/tech-scaleup-italy-2023-report/> .

established and innovative entrepreneurship manages to fully bring out all its potential benefits, generating great value from an economic and social point of view (which, however, happens only in part in our country). One of the main pieces of evidence of this substantial difference between the Italian situation and the one in more developed entrepreneurial contexts is the fact that the number of innovative companies that have been able to break through the seed-stage dimension barrier and become large international companies, the so-called scaleups, remains extremely low. Pre-seed investments receive only 5% of the total capital (around 57 million euro), although they account for 56% of all transactions, while seed receive only 107 million euro.

Up to now, money invested in the Italian startup and scaleup ecosystem are not enough to fill the gap with the other global and European ecosystems. Italy invests the equivalent of 0.24% of GDP in scaleup, well below the European average (1.3%). Here, Italy is underperforming not only in relation to Silicon Valley, Israel and the UK, but also in relation to its neighbors: France invests 1.5% of GDP, Germany 1.2%, Spain 0.8% and Portugal 0.5%. Last, Italy invested \$2.2 billion, while Spain invested \$4.7 billion in the startup sector, France \$10.8 billion, Germany \$14.4 billion and the UK \$40.5 billion.

Moreover, the *P101 Report*<sup>17</sup> on the state of Venture Capital in Italy, highlights that VC financing has decreased to 1 billion euro, -54,8% from the peak of 2022. In the US, venture capitalist, in search of high return, invest in the only hyper-scalable subjects available. That is, the technology startups. They are the only ones, in the age of knowledge, that can go from one million to one billion in less than a decade, and from one billion to 100 in less than twenty years. Thus, venture capital is calibrated to one type of enterprise: the hyper-scalable. All other types of companies, however technological they may be, are not subject to venture capital, but rather to private entrepreneurs, banks, public funds for innovation etc.

For what concerns the human capital development, there are several indicators showing how Italy lags behind with respect to its major European peers. Low educational attainment, and in particular low adult participation in education and training, weighs on the country's workforce

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<sup>17</sup> P101 SGR is one of the leading venture capital firms in Italy, investing in digital and technology-driven companies in Europe.

skills and contributes to weak labour productivity with substantial regional disparities<sup>18</sup>. Italy's firms dedicated only 6.4% of total investment to research and development on average between 2000 and 2019, well below Germany (12.1%) and France (9.7%). This is also related to the fact that Italy labor market possesses a large share of small and medium sized enterprises (SMEs), investing relatively low amounts in research and development leads to weak demand for skilled workers.

Maintaining and increasing human capital also depends on the capacity to build competencies in fields that are more innovative and in tune with technological changes. This seems to reflect that the most competitive sectors are less attractive to Italy's students or that post-upper secondary orientation is not so effective. There are still too few graduates in the ICT sector and low training in the field. Despite the investments to close the “digital divide”, according to the “Digital Economy and Society Index” (DESI)<sup>19</sup> of 2022, Italy ranks 18th among the 27 EU Member States. Despite the hard work to close the gap with the European average, more than half of Italian citizens do not even have basic digital skills.

Going further, it is important to look to the support mechanisms, such as accelerators and incubators, present in Italy to support the creation and development of AI startups. The distinction between "incubators" and "accelerators" is now blurred, at least in practice and it is interesting to note that over 55% of incubators also offer acceleration paths and vice versa. According to the *Social Innovation Monitor (SIM) Report on Italian incubators and accelerators*<sup>20</sup> in Italy, there are 270 incubators and accelerators active, distributed in a rather heterogeneous way throughout the territory. Only 23% of the Italian incubators report a sectoral specialization, which suggests that most of them have a generalist approach: a lack which limits the effectiveness of support offered. Another important aspect underlined by the report is the economic sustainability of the incubators themselves. Many operate with public funds, EU calls for proposals or project funding. This makes them fragile, often forced to pursue contracts rather than build solid and replicable business models.

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<sup>18</sup> DPRS Morningstar Report on “Italy's Human Capital: A Key Social Factor for Economic Development” (2021). Available at <https://dbrs.morningstar.com/research/381313/italys-human-capital-a-key-social-factor-for-economic-development> .

<sup>19</sup> Available at <https://digital-strategy.ec.europa.eu/en/policies/desi> .

<sup>20</sup> Available at <https://socialinnovationmonitor.com/italy-incubators/> .

It is also important to assess the impact of regulation on innovation and, therefore, on the development of AI. There is an extensive literature that analyses the impact of regulation on growth at the macroeconomic level. Many scholars have been concerned that slower growth in countries with heavy regulation, could be due to firms being reluctant to innovate due to the burden of red tape. For example, the slower growth of Southern European countries, including Italy, has often be blamed on onerous labour laws (Schivardi, 2020). In the field of AI, regulation for an ethical and secure development of AI system might slow its evolution. For example, policies may require that data containing information on legally protected statuses like ethnicity, gender, or age, are not used in AI production, limiting access to needed training data resources. Limited training data may reduce algorithmic effectiveness at predicting outcomes (Bessen, 2022). In Italy, red tape is seen as a critical barrier to access to investment and the dynamism of technology startups, preventing the country from emerging in the global AI landscape.

Lastly, national culture impacts levels of entrepreneurship both through the cultural values that are part of that society and through the institutions that are representative of that culture (Kreiser, 2010). Researchers conceptualized an entrepreneurial orientation as consisting of three primary dimensions: innovativeness, risk taking, and proactiveness (Covin & Slevin, 1989; Miller, 1983; Miller & Friesen, 1982). Startups are, by definition, risk-taking operations. They have to deal with giant corporations that are better funded and more firmly entrenched. The culture of innovation and risk-taking becomes a catalyst for organisational improvement. In Italy, risk taking culture has resulted to be an increasingly important theme for enterprises, yet it is still not comparable to the one in the USA. This cultural aspect is a factor of success in the US business ecosystem, as it allows entrepreneurs to learn from their failures and renew their ideas. This culture fosters an environment in which people are inspired to pursue their entrepreneurial aspirations, facilitating the overall vitality of the ecosystem.

## **1.7 Conclusion**

Throughout the literature review, the common characteristics of a successful entrepreneurial ecosystems, able to contribute to high-growth-potential companies, were outlined. Delving into the contribution of each actor in the startup ecosystem is key to understand the process of

emergence and development. The literature review has traced the multifaceted nature of a startup ecosystem, underlining the conditions under which innovative startups, in particular those in high-tech sectors like artificial intelligence, can emerge, last, and scale. The main enabling factors—such as educational institutions, human capital, financing, regulatory clarity, support mechanisms (e.g., incubators, accelerators), and entrepreneurial culture—were determined as essential pillars of a strong startup ecosystem.

At the same time, through the Triple and Quadruple Helix models, it is clear how successful startup ecosystems are characterized by a high degree of connectivity between universities, industry actors, government bodies, and civil society, as well as by efficient access to capital, entrepreneurial culture, and supportive infrastructure. The high technological complexity of AI startups, exacerbate the need of a strong ecosystem supporting them. Even when generic non-innovative startups could survive, AI ventures require well-structured networks, scale-up capacity and vigorous support mechanisms.

Researchers predominantly focused on well-established innovation hubs, however there is no clear evidence that the same frameworks apply in weaker ecosystems, such as those in Southern Europe. That is why the chapter examined the European startup ecosystem and recognizes the EU's growing efforts to support entrepreneurship and AI development through various initiatives. Among with the launch of the European digital decade, various initiatives reflected a clear political will to boost Europe's technological sovereignty and close the investment gap with global competitors like the U.S. and China. However, the review identified persistent fragmentation and inequality across EU Member States, with significant differences in funding availability, infrastructure, and scale-up opportunities.

The observations, then led to the Italian problem of failing to grow emerging startups, demonstrating that Italy, despite policy efforts in recent years, is still maintaining itself as a country poor in scaleups and successful innovative companies. While the number of certified innovative startups has raised, Italy faces structural barriers. Among the obstacles, the lack of adequate financing stands out as the main factor delaying the growth of the whole ecosystem. Moreover, also the lack of human capital and targeted support mechanism are drawn as shortcoming of the system. These weaknesses represent not just national vulnerabilities but also gaps in the broader literature—particularly when it comes to assessing whether models of successful ecosystems developed elsewhere are applicable to the Italian context.

The findings offer a solid foundation for the empirical investigation that follows, which seeks to assess the specific barriers and enabling conditions affecting AI startup scalability in Italy. The next chapter will introduce the research design and methodology adopted to explore this issue. The research question, the variables and the working hypothesis will be presented. After that, the analysis will focus on a single-case study approach supported by qualitative interviews to Italian AI startups.



# Chapter 2 - Research design

## 2.1 Introduction

The following chapter presents the research design adopted to explore the enabling and constraining factors of the Italian startup ecosystem affecting the scalability of AI startups. The main objective is to give account of the methodological choices made in response to the central research question: *How do ecosystem-level enablers and constraints interact to influence the scalability of AI startups in Italy?* To address the question, the chapter first outlines the core variables of the study, that stem out from the literature review analysis. Due to the complexity and context-specific nature of the startup ecosystem, particularly in a dynamic and multifaceted sector as artificial intelligence, a qualitative research approach has been adopted. This allows for an in-depth exploration of perceptions, experiences, and mechanisms that would be hardly captured by a quantitative approach.

A single case study methodology has been used, and Italy has been selected as the case due to its evolving innovation policies, and the persistent structural challenges that continue to affect startup lifecycle. The rationale behind this choice will be explained in detail, highlighting how the Italian startup ecosystem offers a compelling lens to study the broader tensions between innovation, policy, and market readiness in Europe. Data collection has been executed through semi-structured interviews conducted to a range of stakeholders within the Italian AI startup landscape, including founders, investors and ecosystem analysts. Interviews have been designed to discover both systemic and context-specific factors influencing scalability. The chapter will also outline how the interviews were structured, the selection criteria for participants, and the treatment and analysis of the collected information.

Finally, this chapter introduces the interview sample, offering an overview of the conducted interviews, which will be fully examined and interpreted in the final chapter. By doing so, this chapter lays the foundation for the empirical insights that will emerge from the voices of those directly involved in the AI startup ecosystem in Italy.

## 2.2 Research question, variables, hypotheses

The literature review has defined the framework to set the methodological foundation of the thesis. It aims at examining the dynamics of the Italian startup ecosystem for artificial intelligence, with particular emphasis on enabling factors and obstacles to its development. The following paragraph proposes the research question and the key variables that will be analysed during the empirical phase of the thesis.

*RQ: How do ecosystem-level enablers and constraints interact to influence the scalability of AI startups in Italy?*

The following examination will aim at generating new insights into how enabling and constraining factors within the Italian startup ecosystem interact to allow the scalability of AI startups. The analysis will not only identify relevant variables, but it will also explore their interdependence, drawing on patterns emerged from the literature review as well. Italy was chosen as a compelling case since, despite a growing number of innovative startups, structural limitations continue to hinder their ability to scale. Highly complex and capital-intensive sectors, such as artificial intelligence, where resource requirements and ecosystem conditions strongly influence growth trajectories, make these dynamics even more pronounced. Based on the existing literature, the following variables have been identified as relevant for analysing the Italian AI startup ecosystem.

The first variable is represented by the ability to access fundings. It comprises the accessibility to venture capital, angel investors, public incentives, and other financial instruments critical to early-stage startups. Furthermore, fragmented capital markets and the absence of a well-developed secondary market further reduce liquidity, making it harder for startups to attract long term investments and to scale. This has established a major gap, often forcing promising startups to relocate to better equipped and more accessible markets. In Italy, prior analysis has identified capital scarcity as a fundamental barrier, especially in high-risk sectors such as AI (Löfsten, Lindelöf, 2003; Stucki, 2014; Hsu, 2004).

Second, the analysis of the regulatory environment aims at scrutinizing the clarity, efficiency, and business-friendliness of Italy's legal and administrative framework for startups. It includes

both the effects of national regulations and EU-level rules, such as the AI Act. The burden of administrative procedures and the lack of regulatory predictability have been widely recognized as growth inhibitors in the Italian startup landscape. According to Cristobal Alonso, CEO and general partner at Startup Wise Guys *“One important issue is how bureaucracy impacts time and money. Many EU-based startups do establish in US states such as Delaware as it can be done within a day and very cheaply... and obviously in an electronic manner”*

The third variable is represented by human capital accessibility, particularly graduated talents in AI and data science, which are a crucial input for the success of AI startups. Compared globally, the EU is an important hub of STEM talents (Science, Technology, Engineering, Mathematics), with around 19 million professionals, accounting for approximately 5.5% of its labour market. Despite this, Europe’s startup ecosystem still faces talent shortages, including a severe lack of digital skills. This variable includes both the domestic capacity educate and retain qualified professionals and the effectiveness of mechanisms, such as mobility programs (Østergaard, Marinova, 2018; Smith, 1776).

Furthermore, the connectedness of the ecosystem allows to understand the quality of relationships within the startup ecosystem, including ties with other entrepreneurs, mentors, research institutions, and large corporations. The qualification process is key and it always starts with creating a genuine human relationship and building a clear action plan together. A lack of embeddedness in dense innovation networks hinders learning opportunities and internationalization capacity (Lehmann et al., 2020; Walter et al., 2006; Isenberg, 2013).

The last variable emerged from the literature review regards the support mechanisms, including incubators, accelerators, public-private partnerships, and university-industry linkages, which are crucial to reduce the uncertainty typical of early-stage innovation, offering infrastructure, mentorship, and strategic guidance (Mazzucato, 2011; Mowery, 1999).

The working hypothesis underpinning the research is that the scalability of Italian startups, particularly in the AI sector, is not influenced by isolated factors but by the interaction of multiple ecosystem-level constraints and enablers. Specifically, access to capital, availability of human capital, ecosystem connectedness, support mechanisms and the regulatory environment are expected to influence the scalability of AI startups in Italy. Moreover, the study will try to uncover new enabling or constraining factors rising from interviews with AI startup founders

or members, allowing the identification of dynamics not entirely captured in the existing literature. This hypothesis will be tested through a qualitative, single-case study design focused on the Italian ecosystem, supported by some structure interviews to Italian AI startup founders or developers. The aim is to validate existing models, and to identify context-specific dynamics that could influence both theory and policy.

## 2.3 Qualitative research

According to Matthew B. Miles (2014), qualitative analysis is a source of well-grounded, rich descriptions and explanations of human processes. With qualitative analysis, it is possible to preserve chronological flow, see which events led to which consequences, and derive useful explanations. Moreover, good qualitative data can lead to accidental findings and to new integrations to existing literature. It supports researchers get beyond initial understanding and generate or revise conceptual frameworks (Miles et al., 2014).

Qualitative research may be conducted in many ways: Saldaña (2011) describes more than 20 different qualitative research genres, ranging from well-established traditions such as ethnography, grounded theory, phenomenology, case study, and content analysis to more progressive genres of qualitative research, such as poetic inquiry, narrative inquiry, ethnodrama and autoethnography. They are all characterized by different characteristics but there are also some common features occurring in most of qualitative inquiries. First, qualitative research is driven by in-depth contact with participants to investigate the characteristics of individuals, groups, societies, and organizations. Then, researcher's role is to gain a holistic overview of the context under study, and it attempts to capture data on participants suspending preconceptions about the topics under discussion. After that, the researcher can read through the collected materials and construct certain themes and patterns. These features may appear relevant for naturalistic studies, but they are configured and used differently in any research tradition (Miles et al., 2014).

The challenge in qualitative research is discovering coherent descriptions and explanations that include all of the gaps, discrepancies, and contradictions inherent in personal and social life. The risk is to force the logic, the order, and the credibility that compose theory making on the uneven nature of social life. Qualitative data in this thesis will appear in the form of words. In

this analysis, the words collected are based on interviews to AI startup funders of developers. These data collection activities are not immediately accessible for analysis. Data need some type of processing: drafts need to be expanded and typed up and audio recordings need to be transcribed and corrected. Instead, one of the strengths of qualitative data is related to *local groundedness*, that is the fact that data are collected in closeness to a specific situation. The emphasis is on a specific case; therefore, it allows to analyse a focused and bounded phenomenon embedded in its context. The influences of the local context are not stripped away but are taken into account (Miles et al., 2014).

Another characteristic of qualitative data is their holistic overview, with strong potential for revealing complexity. Such data provide “thick descriptions” that are nested in a real context (Geertz, 1973). Moreover, qualitative data are advocated as the best strategy for developing hypotheses. In addition, they have strong potential for testing hypotheses, seeing whether specific predictions hold up. Finally, qualitative data are useful when one needs to supplement or validate quantitative data gathered from the same setting (Miles et al., 2014).

## **2.4 Single case study methodology**

Case study research investigates into a real-life phenomenon and within its environmental context (Ridder, 2017). Typically, non-random samplings are chosen for case study research; indeed, there is no sample that represents a larger population. Contrary to quantitative logic, the case is chosen, because the case is of interest (Stake 2005), or it is chosen for theoretical reasons (Eisenhardt and Graebner 2007). Dyer and Wilkins (1991) argue that the core of a case study lies in the careful study of a single case to detect new relationships. Classical case studies opt profound descriptions of a single case, considering the context to reveal insights into the single case and by that elaborate new theories. The comparison with multiple cases, hence, tends to surface descriptions. This undermines the possibility of context-related analysis.

Among the advantages of a single case study there is the possibility to gain a better understanding of “how” and “why” things happen. In single case study research, the chance to open a black box arises by looking at deeper causes of the phenomenon (Fiss, 2009). The case data can guide to the recognition of new patterns and relationships, creating, expanding, or testing a theory (Gomm et al. 2000). As a result, case study research has different objectives

with regard to contributing to theory. On the one hand, one of the strengths of case study research is expanding constructs and relationships within distinct settings (e.g., in single case studies). On the other hand, case study research is a means of advancing theories by comparing similarities and differences among cases (e.g. in multiple case studies) (Ridder, 2017).

According to Eisenhardt (1989), and her rationale of “no theory first”, the research question should stem from a research gap meaning that the research question is of relevance. A priori variables are only used to guide the investigation. Thus, researchers may formulate a research problem and specify some potentially important variables, with some reference to extant literature. In this perspective, the current thesis, while acknowledging priori variables suggested by the literature, explores how these known factors interact and remains open to the identification of new enabling or constraining conditions.

Cases are selected for theoretical reasons: for the likelihood that the cases offer insights into the phenomenon of interest. Theoretical sampling is considered appropriate for extending constructs and identifying relationships for the phenomenon under investigation (Eisenhardt & Graebner, 2007). This study uses theoretical sampling to select Italian AI startups representing diverse experiences with scalability within the national entrepreneurial ecosystem. There are two reasons behind this choice: first, AI startups operate in a highly complex and capital-intensive sector, making them ideal to observe how systemic enablers and constraints interact; second, their position at the intersection of technological innovation and regulatory complexity allows for the identification of dynamics that may not be evident in other industries.

With respect to collecting data, qualitative ones, as shown in the previous paragraph, are the primary choice. Usually, data collection relies on a triangulation between interviews, documents, and observations. A combination of qualitative data and quantitative data is also possible (Eisenhardt, 1989). Data analysis is conducted via the search for within-case patterns and cross-case patterns. Systematic procedures are undertaken to compare the emerging constructs and relationships with the data, eventually leading to new theory. On the other side, according to Yin theory (2014), case study research design can also aim at identifying gaps in existing theory with the goal of advancing theoretical clarification (Ridder, 2016). This case study research design includes a ‘how’ and ‘why’ question (Yin, 2014). Research questions are identified using existing literature, looking for key studies and identifying gaps. According to Yin’s design, the starting point of case study research is the existing theory.

Furthermore, Yin (2014) underlines the role of interviews, which are the main source of data collection. Nevertheless, he also considers other sources of qualitative data as well. Data triangulation is designed to limit problems of construct validity, as multiple sources of data provide numerous measures of the same phenomenon. Moreover, Yin (2014) provides several strategies and analytic techniques for data analysis. In analytical generalization, the theory is compared with the empirical results, leading to the modification or extension of the theory.

In this thesis, numerous of the previous theories find application. Indeed, the startup ecosystem for artificial intelligence represents a composite, vibrant, and context-dependent phenomenon. It involves different actors, for instance startups developers, investors, institutions, regulators, which interact through evolving patterns, and high degrees of uncertainty. These characteristics allow to exploit the advantages of the single case study methodology. Startup ecosystems for artificial intelligence are an evolving and dynamic phenomenon, in particular in those countries that are not considered as innovation hubs. In this context, as Ridder (2017) and Dyer & Wilkins (1991) assert, a single case study methodology is effective because it captures the complexity of the phenomenon. Startup ecosystems are determined by a number of factors, such as policies, finance, social dynamics, culture, requiring a contextual analysis.

Moreover, single case study is useful when trying to build new theories and address literature gaps. In the case of the Italian startup ecosystem, little evidence exists in the field of artificial intelligence. For this reason, as Yin (2014) underlines, this methodology is helpful to develop and extend existing theories. It represents a valuable approach to study the emergence and *local groundedness* (Miles et al., 2014) of startup ecosystems.

## **2.5 Why the Italian case**

The case of Italy is chosen for several reasons. First, as analysed throughout the regional analysis in the literature review, the Italian startup ecosystem remains underdeveloped if compared to other European economies. This gap is particularly evident when it comes to innovative sectors like artificial intelligence. Indeed, Italy underperforms with respect to the EU average: key indicators such as R&D expenditure, venture capital availability, and the little presence of focused support mechanisms, clearly show how Italy lags in this strategic field

(European Commission, 2023). These shortcomings make Italy a fascinating case for investigating the obstacles and enablers faced by AI startups. Moreover, apart from the key data and indicators published by European reports, academic literature on the Italian startup ecosystem is limited. For this reason, this thesis will seek to fill the gaps and explore whether there are any elements of novelty or emerging dynamics, distinctive of the Italian startup ecosystem.

Furthermore, the preference for Italy is also motivated by practical aspects: the understanding of the Italian language and the knowledge of the Italian institutional and legislative landscape facilitates the access to qualitative data during the interviews. Indeed, it is important to remind that Italy's status as a member state of the European Union makes its legislation layered. Innovation policies in Europe operate in a multilevel governance framework (Borrás & Edquist, 2013), therefore, it is relevant to explore how national innovation legislation interacts with EU-level initiatives—such as the Digital Europe Programme, Horizon Europe, or the AI strategies. Thus, investigating the Italian case not only clarifies a specific national ecosystem but also contributes to understand how European innovation and industrial policy spreads across member states.

## **2.5 Semi-structured interviews**

Interviewing allows to collect valuable data or information from people and to access perception or understand the meaning constructed or developed by the respondent. This also includes respondent's definition of a situation and the reality as experienced by them. An interview is a data collection method involving questions to get answers from the research participant. The process of asking questions can be either very flexible or inflexible, that means to follow strictly the questions decided beforehand (R. Kumar, 2011). In social research, qualitative interviews are widely used since, compared to other research methods, they are closely related to the approaches of interpretative sociology. Unlike standardized questioning, qualitative interviews allow a discursive understanding of a phenomenon and different interpretation of it. In qualitative interviews, researchers usually orient themselves according to an interview guide. The guide can be followed freely in the formulation of questions, follow up strategies and sequencing.

In this thesis, semi-structured interviews are going to be used. The semi-structured interview is a qualitative research method consisting of collecting data on facts discovered during oral exchanges (Albaret, M., & Deas, J. 2023). It is meant to find the world views of respondents in a flexible manner, in relation to a fixed research goal (Bryman, 2012). Semi-structured interviews establish a social relationship to generate direct interaction with another individual, who is at the same time the researcher's interlocutor and subject of study. Scholars typically distinguish them from close-ended or structured interviews, in which the same questions are demanded in the same order and the respondents must choose their answer from a limited number of responses. They are also different from open-ended or unstructured interviews, which proceed freely from an initial question (Albaret, M., & Deas, J. 2023).

Semi-structured interviews are usually chosen for a variety of reasons. First, they aim at constructing, specifying, and refining the research object and opening up the field of investigation. Second, semi-structured interviews are also of an informative nature. Since startup ecosystems are wide and multi-layered structure that keeps evolving quickly, semi-structured interviews can be the only viable way to discover factual data, accessing certain types of information, and reconstructing a course of decision-making processes. Lastly, semi-structured interviews are often combined with other data collection methods, for instance literature, reports or participant observation. Interviews help triangulate other and contextualize facts, speeches, or observations made by the researchers (Albaret, M., & Deas, J. 2023).

Four potentially challenging issues related to semi-structured interviews can emerge: access and logistics issues, for instance sampling frame, networking, and time and cost issues; ethics and confidentiality, that refers to recording, anonymity, culture of secrecy, trust; power dynamics, that is linked to building and sticking to interview guides, positionality, control and manipulation; data analysis and use in the final work, which relates to quality/reliability/validity of data, transcribing, triangulating and verifying, quoting (Albaret, M., & Deas, J. 2023).

Semi-structured interviews are suitable for this thesis because the Italian AI startup ecosystem is a complex and rapidly evolving sector with several agents (founders, developers, investors, institutions) and components interacting among them. Using structured and rigid interviews would risk missing unexpected insights, while semi-structured interviews allow to discover emerging trends and novelties. Moreover, using semi-structured guide allows the researcher to

adapt questions to different respondents while maintaining a core focus on the research question. This enables to compare the responses while capturing diverse viewpoints.

Before conducting semi-structured interviews, preliminary works, such as research question, hypothesis and objectives of the research, have been fixed. Then, the interviews subjects have to be identified. The choice of sampling method needs to adapt to empirical constraints, such as access to and familiarity with the field, respondents' status, culture of secrecy and research topic's sensitivity. Nowadays, a lot of contact information can be accessed through the web or social media. For instance, in this thesis the web pages of Italian AI startups and LinkedIn have been crucial. Mainly email and messages were used to contact the respondents.

Afterwards, a flexible semi-structured guide was drafted, identifying a number of essential questions tailored on the field of research, in this case AI startup ecosystem enablers or obstacles, and on the targeted people, depending on if they are founders, developers or financier of AI systems. The interview guide may contain "structuring" questions, along with "follow-up" and "specifying" ones to get the respondent to elaborate his own answer. Recording "facilitates the use of a conversational style and minimizes information loss" (Aberbach and Rockman, 2002). Whether or not the interview is recorded, the researchers should take handwritten notes to retrieve the context and details of each interview.

## **2.6 Analysis and treatment of the collected data**

The data collection is then turned into an academic analysis through data manipulation and interpretation. By coding the interview transcriptions, scholars organize data, compare them and go beyond description by integrating them into a conceptual or theoretical analysis (Gibbs, 2018). Qualitative research methods involve a continuing interaction between data collection and theory. In examining data, the analysis will focus on patterns appearing across several observations that typically represent different cases under study, an approach called cross-case analysis (Babbie, 2014).

According to Drever (2003), there are three stages to engage in to extract qualitative data from the interviews. The first step is data preparation during which the interviewer is required to work clean the raw data and put them into a form that is easy to work with. This allows to work

with the data easily in the later stage. Moreover, managing data according to their properties is important to secure data manageability while retaining as much of the original information as possible and preventing any distortion (Drever, 2003). If this applies properly, it will make the researcher become familiar with the full range of collected data. Thus, this will allow identifying specific materials quickly.

The second step is categorising and reorganising the data and seeking patterns related to the research questions (Drever, 2006). Categorising, coding, and counting data is conducted on the basis of the questions addressed in the research. This will make it easier for the researcher to track where materials come from, from which respondent, and from which interview question. Categorising key themes was done according to the main dimensions addressed in the research, including access to capital, human capital, ecosystem connectedness, availability of support mechanisms, and regulatory environment. Nevertheless, the coding scheme was kept flexible to allow the emergence of new enabling or constraining factors not identified in the literature.

The final step is summarising the results. The interviewer uses the patterns to develop conclusions. This reflects the flexibility of the semi-structured interviews compared to other data collection methods. Emergent insights are integrated with the originally hypothesised variables, ensuring a comprehensive understanding of the phenomenon. The flexibility of semi-structured interview allows to identify and incorporate unexpected themes into the final analysis.

Researchers must consider at least two ethical issues that could emerge in the analysis and reporting of qualitative research. First, since it calls so directly on subjective judgments, researchers face the risk of seeing what they are looking for or want to find. Second, protecting subjects' privacy becomes an important issue in qualitative research. The qualitative researcher will often analyse, and report data collected from specific, identifiable individuals (Babbie, 2014).

## **2.7 Overview of the conducted interviews**

As part of the qualitative analysis conducted for the thesis, eight semi-structured interviews were carried out. Six of them were held with Italian AI startups: *Pointout*, *Lexhero*, *ASC27*,

*MrCall*, *Brandplane*, *The Nettuniani*. Moreover, one interview was conducted to *Innovup*, which is the association that represents the Italian innovation ecosystem and connects startups, scaleups, innovative SMEs, innovation centres, science and technology parks, incubators, accelerators, enablers, investors, professional companies and corporations. Lastly, one interview was conducted to the *Italian Tech Alliance*, which is a private, independent and non-profit association whose objective is to promote the development of Italian technological companies and those who invest in them, increasing the awareness of private and public stakeholders on the specific characteristics of innovative startups and their role in the economic and social growth of the country.

The interviews were conducted over a period of two months, according to the availability of the participants. Initial contact with interviewees was made mainly through email or LinkedIn, and all interviews were conducted via video calls. An interview guide was prepared in advance, and it was used to steer the conversations. Nevertheless, the interviews were conducted in a flexible manner, allowing the conversation to evolve organically. The interview guide is included in the annexes of this thesis.

The startups involved operate in different areas within the artificial intelligence ecosystem, representing significant sectoral heterogeneity. Some of them focus on digital services and process automation, such as virtual assistance for call management or platforms for customer service optimisation. Others are active in the legal tech area, applying AI to the drafting and management of contractual documents, or in the field of cybersecurity and data analysis. The sample also includes startups focused on marketing and communication, using AI to support content marketing strategies and improve media relations. Finally, one of the companies interviewed operates in the climate tech sector, integrating AI and the Internet of Things for monitoring water resource management and climate adaptation solutions in urban contexts.

This variety reflects the heterogeneity of the AI sector in Italy, where vertical applications respond to very different needs – from environmental sustainability to legal services, cybersecurity and marketing. This diversification is crucial for interpreting the results of the analysis, as scalability challenges and interactions between constraints and enablers can take on different characteristics depending on the application context, even though they are part of the same ecosystem. Alongside start-ups, leading organisations in the Italian entrepreneurial ecosystem, such as national trade associations, were interviewed to integrate the perspective of

businesses with that of actors who play a coordinating and advocacy role. This contributes to a more comprehensive view of the systemic dynamics that influence the scalability of AI startups in Italy.

The main themes addressed during the interviews were drawn from the literature review to ensure coherence with the variables identified as relevant for the scalability of Italian AI startups. All the interviews will be analysed in the last chapter of the thesis, where the key findings will be presented and compared to the elements emerged from the literature review. The analysis aims to detect specific characteristics of the Italian AI startup ecosystem, highlight emerging challenges and opportunities, and try to formulate policy recommendations to support the growth and competitiveness of AI startups in Italy.

## 2.8 Conclusion

This chapter has explored the research design employed to investigate the enabling and constraining factors affecting the functioning of the Italian AI startup ecosystem. The methodology aims to respond to the research question: *How do ecosystem-level enablers and constraints interact to influence the scalability of AI startups in Italy?*. The chapter presented the rationale for the adoption of a qualitative research approach and a single-case study design. It enables a comprehensive and context-sensitive exploration of the Italian landscape, which was selected as a compelling case due to its recent policy initiatives in support of innovation, linked with persistent structural weaknesses hindering startup growth and competitiveness.

The qualitative approach, grounded in interpretative methods, allowed for an in-depth understanding of the perspectives, experiences, and perceived obstacles faced by the actors within the AI startup domain. A total of eight semi-structured interviews were conducted: six with Italian AI startup founders or executives, and two with other actors of the ecosystem—*InnovUp* and the *Italian Tech Alliance*. This provided a diverse range of voices from within the ecosystem. The participants were interviewed around an interview guide informed by the literature review yet were conducted flexibly to allow for the emergence of new insights. The core themes discussed included access to capital, the availability of skilled human capital, the regulatory and bureaucratic landscape, the presence and quality of support mechanisms, and

the overall connectedness of the ecosystem. These working variables were selected basing on their recurrence in existing academic literature.

This chapter has established the foundation for the following empirical analysis. The next chapter will examine the interview information in detail, interpreting the outcome through the analytical framework developed here. Its primary objective is to assess the working hypothesis while uncovering new elements or context-specific dynamics that the existing literature does not fully capture. Identifying distinctive characteristics of the Italian AI startup ecosystem will be crucial for enriching theoretical understanding of scalability within entrepreneurial ecosystems.

## Chapter 3 – Analysis and discussion

### 3.1 Introduction

The following chapter outlines the findings of the research, aiming to answer the research question: *How do ecosystem-level enablers and constraints interact to influence the scalability of AI startups in Italy?* The analysis employs a qualitative research approach, with semi-structured interviews conducted with eight Italian AI startups. The main objective is to assess the working hypothesis trying to uncover context-specific elements or dynamics that the existing literature does not capture. This is therefore crucial for enriching the theoretical understanding of the scalability of the Italian AI startup ecosystem.

The first part of the chapter uses the material collected through the interviews, focusing on the key variables that shape the Italian AI startup ecosystem. The variables, identified in the previous chapter, include the difficulties in accessing financing, the availability of human capital and the structural issue of low expenditures in R&D, the insufficient technology transfer, and the fragmentation of the regulatory environment. The analysis identifies the enabling and constraining factors, and their interaction, influencing the growth of startups in this sector.

The second section shifts to the discussion, linking the empirical evidence with the broader theoretical and policy framework. Through this double structure, analysis and discussion, the chapter gives a comprehensive insight of the Italian AI startup ecosystem, highlighting both the systemic weaknesses and the opportunities for renewal. It underlines how new ways of financing, political coordination, and an entrepreneurial renewal can contribute to strengthen the foundations for scalability. In this sense, the chapter advances both empirical and theoretical knowledge, offering insights relevant for scholars and policymakers interested in reviving innovation and competitiveness in the Italian startup ecosystem.

### 3.2 Analysis

#### 3.2.1 Limited access to finance: a structural bottleneck for Italian AI startups

Access to finance results as the main critical challenge for startups and scaleups across the European Union, hindering their potential for innovation, growth and global competitiveness, especially in highly resource-intensive sectors such as artificial intelligence. Despite ongoing initiatives, both at national and European level, such as InvestEU program, the European Competitiveness Fund, Horizon Europe and local startup Visa programs, and in public funding remain strong, private investment lags behind global competitors like the United States. Moreover, the gap is further exacerbated by fragmented capital markets and the lack of a well-developed secondary, making it harder for startups to attract investments and to scale.

The literature review as well underlined this critical challenge: according to Salamzadeh (2015), any startup faces financial issues and problems for multiple reasons and in different. For instance, during bootstrapping the founder negotiates with family members and friends to convince them to invest in his idea. In the seed stage, founders should look for angel investors and convince him with reasonable valuation plans. Next, in the creation stage, the founder should draw up a plan to take advantage of venture capital. Financing is a crucial factor not only in the early phases of operation, but it greatly affects the profit of a startup business (Stucki, 2014).

Throughout the interviews, this significant gap appeared clearly as the first constraining factor for Italian AI startup, often forcing promising startups to resettle in other more accessible markets. Despite the increasing interest of investors in artificial intelligence and deep tech products, Italian investors remain mostly risk-averse, often preferring tangible assets or more mature ventures. This results particularly challenging in the first phases of the startup's lifecycles. According to the founder of *Mrcall*, investors in Italy only invest in very solid and well-known businesses, underscoring an extensive reluctance to support emerging actors.

The structural weaknesses of the finance landscape in Italy are reflected in data. Up to now, money invested in the Italian startup and scaleup ecosystem are insufficient to fill the gap with the other global and European ecosystems. Italy invests the equivalent of 0.24% of GDP in scaleup, well below the European average (1.3%). Here, Italy is underperforming not only in relation to Silicon Valley, Israel and the UK, but also in relation to its neighbors: France invests 1.5% of GDP, Germany 1.2%, Spain 0.8% and Portugal 0.5%. Last, Italy invested \$2.2 billion,

while Spain invested \$4.7 billion in the startup sector, France \$10.8 billion, Germany \$14.4 billion and the UK \$40.5 billion.

Furthermore, Italy lacks adequate financing specifically in the artificial intelligence sector. In 2024, the entire Italian Venture Capital invested in AI startups about 130 million euros, too little if compared to other European countries, such as France and Germany, where investments reached 2 billion euros each. By taking a glance to France, the investments in innovation and new technologies are massive. France has positioned itself for the sixth consecutive year as the first European destination of international investments. The artificial intelligence sector has been gaining momentum and the success of the AI Summit, held in February 2025, confirmed the trend, generating national and international investment commitments reaching 109 billion euros. This comparison highlights the need for Italy to adopt a more ambitious strategy to keep the pace of the global AI race.

During the interview with the *Italian Tech Alliance*, particular attention was given to the French AI startup ecosystem. Indeed, over the years, France has become a benchmark in the development of AI: third in the world in terms of the number of AI researchers, first in Europe for generative AI, and fifth in the Global AI Index. Today, there are more than 1,000 startups specialising in artificial intelligence, supported by a favourable environment for research and funding. In 2024, AI was a key driver of venture capital attractiveness in France, with €1.9 billion raised by national startups, including Mistral AI, Poolside and H, which signed major deals on a global scale<sup>21</sup>.

A positive trend can be traced in Italy as well. According to the scenario outlined by the *Quarterly Observatory on Venture Capital in Italy*, developed by Growth Capital, the leading tech investment bank in the Venture Capital ecosystem, in collaboration with Italian Tech Alliance, it emerges that in 2024, investments in startups and innovative companies in Italy grew by 28% compared to 2023, reaching 1.5 billion, raised in 417 investment rounds, also growing by 31% compared to 2023, confirming 2024 as best year in terms of number of rounds. As shown in the following graph, among sectors, software leads in the number of rounds, largely driven by the surge in AI verticals, signalling a growing desire for artificial intelligence solutions within the Italian innovation ecosystem.

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<sup>21</sup> Choose France Dossier. 8<sup>o</sup> édition du Sommet. 19<sup>o</sup> May 2025.

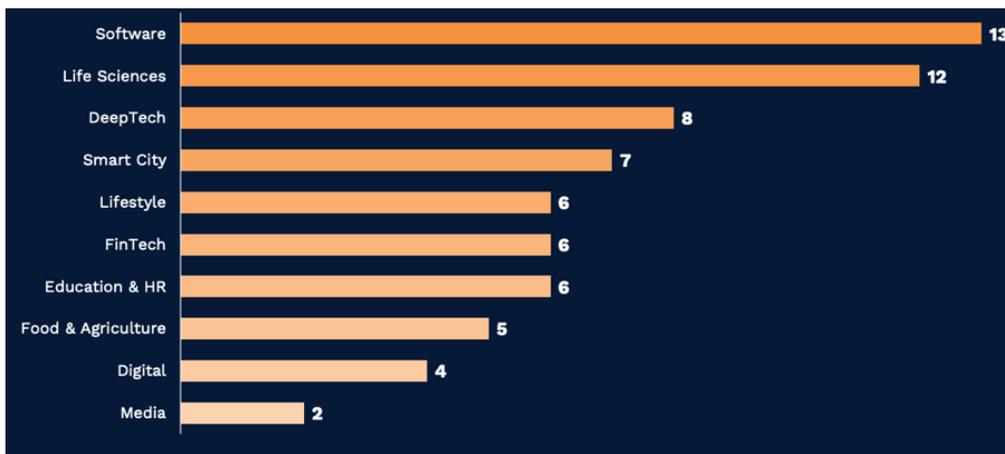


Figure 1. Analysis by sectors Q2-24: number of rounds

Furthermore, the interview with *Innovup* underlined the crucial role of CDP Venture Capital, established in 2020, in the financing of the Italian startup ecosystem. Italy has been positively affected by the entry of CDP Venture Capital, by comparing data from 2012 (the year the law for innovative startups was introduced) to 2020, the growth of the ecosystem has more than doubled. Moreover, over the last ten years, the Italian venture capital (VC) market has experienced an acceleration: between 2013 and 2023, investments in VC increased sevenfold, compared to a tripling observed in France and Germany. Despite this positive dynamic, Italy still lags far behind its main European partners, in terms of both the overall volume of investments and the maturity of the sector.

Major structural limitations persist in Italy's underdeveloped capital markets. In the literature review, venture capital was highlighted as the form of financing with the most significant impact on the development of innovative entrepreneurship (Hsu, 2004). Indeed, venture capital continues to be a form of financing that maximizes returns and minimizes risks compared to other private asset classes, yet the comparison with other global competitors is harsh. In 2024, US venture capital investments reached approximately €210 billion, compared to only €57 billion for the entire European Union. The disparity is even more pronounced in the artificial intelligence sector alone where the US invested \$68 billion, compared to €8 billion in the EU and €15 billion in China.

In addition, another critical factor is the scale of venture capital funds. The United States now counts 113 venture capital funds with assets exceeding \$1 billion, compared to just 11 in the

EU. This structural differential explains the impact that VC has had on the evolution of the American tech industry, with a growing share of tech IPOs backed by venture capital: from 55% in the period 1980–1994 to 68% between 2010 and 2024. Even global players such as Google, Meta, and Tesla grew thanks to VC funds in the early stages of their development<sup>22</sup>. This ecosystem dynamic is still missing in Europe, and even more so in Italy.

As regards the contribution of institutional investors to the development of venture capital in Italy, the picture that emerges is one of low exposure by social security funds and pension funds. At the end of 2023, 11 out of 21 pension funds invested in venture capital, for a total of approximately \$311 million, corresponding to 0.29% of total assets. The Competition Law of December 2024 introduced a progressive allocation requirement: at least 5% of qualified investments must be allocated to VC by 2025, and 10% by 2026. If all institutions attained the first target, €908 million could be mobilized, while achieving the second target would amount to almost €2 billion. Of this, approximately €788 million would come from pension funds and €1.17 billion from pension funds. These resources would have a significant macroeconomic impact. The highest value would be achieved thanks to the leverage effect activated by additional private investments and corporate venture capital, which would expand the impact on the Italian innovation ecosystem<sup>23</sup>.

Financial behaviour of Italians is another aspect that emerges as a critical factor from the *Survey on Savings and Financial Choices of Italians 2025*, carried out by Intesa and the Einaudi Foundation. In 2025, the percentage of Italians saving money stood at 58%. This is the highest value in the last twenty years, an increase compared to 2023 (52%) and 2024 (56%). On the investment front, however, there is a different trend. Around two thirds of Italians choose not to invest, preferring the security perceived by liquidity. Safety continues to prevail among the objectives that interviewees set themselves when using savings. A lack of financial literacy certainly contributes to determining the prudence of the sample: only 4 out of 10 subjects consider their level of competence sufficient.

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<sup>22</sup> Report by TEHA Group S.p.A. in collaboration with CDP Venture Capital “Investire nel futuro dell’Italia: il ruolo strategico del risparmio privato”, April 2025. Available at [https://www.cdventurecapital.it/resources/cms/documents/Comunicato\\_stamp\\_a\\_CDP\\_Venture\\_Capital\\_WS\\_Finanza\\_2025.pdf](https://www.cdventurecapital.it/resources/cms/documents/Comunicato_stamp_a_CDP_Venture_Capital_WS_Finanza_2025.pdf).

<sup>23</sup> Report by TEHA Group S.p.A. in collaboration with CDP Venture Capital “Investire nel futuro dell’Italia: il ruolo strategico del risparmio privato”, April 2025.

To address these structural weaknesses, an important aspect emerged in the interviews, is the necessity to strengthen the Capital Markets Union (CMU). While CMU has made progress, the overall private equity market within Europe is still less mature and the flow of capitals remains constrained. Both Draghi and Letta reports in 2024 emphasized the need for solid financial structure and adequate tools to accompany businesses, especially in the initial and expansion phases.

Moreover, the EIC Fund serves as the venture investment arm of the European Innovation Council, with a budget of €10bn, providing capital to startups and SMEs, particularly those developing disruptive innovations that are considered too risky for private investors. Having said this, some EU programs, when compared to those in the US, could be greater in terms of the size of their funding: European Innovation Council's (EIC) Pathfinder instrument, has a budget of EUR 250 million for 2024, whereas, US ARPA agencies (a similar initiative) have considerably higher value (DARPA: \$4.1 billion; ARPA-H8: \$1.5 billion; ARPA-E9: \$0.5 billion). There are also issues related to complexity and to scarcity of focus specificity (the available resources are split across too many sectors, lacking to address some EU priorities that may be crucial for the development of new technologies). It would be necessary to simplify the requirements to access funding and the overall capital allocation process, to ensure that the EU meets its innovation and development goals.

According to the recommendations of the European Council on the economic, social, employment, structural and budgetary policies<sup>24</sup>, Italy's capital markets should be further developed, with a view to increasing new listings on the main exchange market. Access to non-bank finance is limited for innovative businesses, as the domestic venture and growth capital market is still underdeveloped. The relatively underdeveloped capital markets limit the exit options for private equity and venture capital investors, further compounding the lack of funding sources for innovation. Enhancing innovative firms' access to non-bank finance requires further action to support initial public offering (IPO) listings and develop a dynamic ecosystem for venture and growth capital. This involves stimulating the participation of

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<sup>24</sup> COM(2025) 212 final of the European Council on the economic, social, employment, structural and budgetary policies of Italy. Brussels, 4.6.2025.

domestic institutional investors and large corporations in both listed and unlisted equity markets.

### 3.2.2 The role of incubators and support mechanisms

The certified incubators of innovative startups operate in the field of incubation and acceleration of new innovative high-tech enterprises. According to the *Social Innovation Monitor (SIM) Report on Italian incubators and accelerators*<sup>25</sup>, in Italy, there are 270 incubators and accelerators distributed in a heterogeneous way across the territory. The regions with most structures are Lombardy, Lazio, Emilia-Romagna and Piedmont, confirming an historical trend that sees the North more active in terms of innovative entrepreneurship. A downside of these figures is that just 23% of the Italian incubators record a sectoral specialization, this implies that most of them have a generalist approach. Consequently, this can limit the effectiveness of support offered. Another aspect underlined in the report regards their economic sustainability: many incubators operate with public funds, EU calls for proposals or project funding, making them precarious and often forced to pursue contracts rather than build stable and replicable business models.

The literature review highlighted business support, such as incubators and accelerators, as a crucial component for a successful entrepreneurial environment. They can reduce the uncertainty typical of early-stage innovation, offering infrastructure, mentorship, and strategic guidance. Lack of access to such support mechanisms increases the risk of failure (Salamzadeh, 2015 a, b). This was confirmed across the interviews: incubators and accelerators are key players in the expansion of innovation in the Italian startup ecosystem. They not only support startups, but they also act as drivers of social and territorial development. In Italy, an estimated 5,780 startups have been incubated, an increase of around 100% compared to the previous year. Their economic influence is also substantial: the total revenue exceeded €600 million, marking an increase of 20%. The main acceleration programmes accessed by respondents include CDP's *Frontech*, Intesa Sanpaolo's *Up2Stars* and *Magic Mind*, an initiative promoted by Zest.

One of the main concerns emphasised during the interviews is not related to the existence of acceleration or incubation programs but to their size. As the co-founder of *Point-Out*, claimed,

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<sup>25</sup> Available at <https://socialinnovationmonitor.com/italy-incubators/>.

while acceleration programs in the USA typically offer a minimum of €250,000, the amounts provided in Italy and in Europe are significantly lower. Moreover, as underlined by the CEO of *ASC27*, accessing these funds sometimes requires more energies than the tangible benefits they ultimately deliver to startups.

Italian acceleration programs represent important initiatives to support AI startups, nevertheless they remain restricted in scale compared to USA counterparts. *Frontech*, launched in 2024 by CDP Venture Capital, offers €120,000 pre-seed funding and opportunities for proof-of-concept development with partner companies. Similarly, *Magic Mind* aims at positioning Italy as a hub for AI innovation, creating a full-cycle platform for advanced technical expertise, while *Up2Stars* by Intesa Sanpaolo has accelerated 80 startups since 2022, even accompanying some of them to the Silicon Valley. However, these programs handle modest financial resources if compared to *Y Combinator*, one of the most influential USA accelerators, which provides \$500,000 per startup, broad mentorship, and direct access to a global investor network. *Y Combinator* has created global leaders like Airbnb, Dropbox, and OpenAI, reflecting a structural difference in scale, capital availability, and ecosystem connectivity that continues to place the U.S. at a significant advantage in the AI race.

There is no need to look only overseas, as France has significantly boosted its startup infrastructure. Flagship institutions, such as Station F and EuraTechnologies, have contributed to position the country as a European leader in acceleration. While funding levels are still more modest than USA accelerators, the French ecosystem offers a robust framework, lower equity caps, thematic specialization, especially in AI startups, and international reach. By contrast, despite Italy's advancements in acceleration and incubation programs, the Italian startup ecosystem still lacks the robustness and scale needed to compete effectively on the global stage.

In this perspective, one last obstacle was underlined during the interview with the co-founder of *The Nettuniani*. He emphasized that the fragmentation of support programs, not only among Member States but also at the regional level within them, represents a significant impediment. In the case of *The Nettuniani*, this bottleneck represented an even greater obstacle since they were trying to deal with this fragmentation from abroad. Consequently, this could result in missed opportunities. A preferable approach would be to further centralise the management of funds, accelerators, and other incentives at the European level by establishing a unified governance structure. As underlined by the existing literature, a lack of connectedness in

innovation networks hinders learning opportunities and internationalization capacity. While a supportive environment facilitates the success of startups, a disconnected one could result in failure (Boeker, 1988).

### **3.2.3 Limited availability of human capital and low expenditures in R&D**

Compared globally, the EU is a major hub of STEM talent (Science, Technology, Engineering, Mathematics), with about 19 million professionals, accounting for approximately 5.5% of its labour market. Human capital accessibility was highlighted as one of the main challenges for the scalability of innovative startups also by the existing literature. Since Smith (1776) first recognized human capital as an asset of economic value, scholars have extensively focused on its impact on economic performance. This is also underlined in the Triple and Quadruple Helix Model, which claims that educational institutions are key actors for the well-functioning of the entrepreneurial ecosystem, and they are particularly important in the early stages of the life cycle of startups and new enterprises, collaborating to build specific skills.

Nevertheless, Italy still faces talent shortages, resulting in a severe lack of digital skills, making it increasingly difficult to sustain innovation and support the growth of high-tech sectors such as AI. This emerged as a recurring theme in the interviews. The growing global demand for highly specialized profiles has increased competition for top talents, creating significant challenges for recruitment. This talent scarcity is intensified by brain drain, as many skilled professionals choose to relocate to other regions where they are attracted by substantially higher salaries and more career opportunities, in particular in the Middle East or the United States.

Importing talent from outside the European Union remains a significant obstacle due to complex visa procedures and national work permit systems. Current startup visa programs are limited, making Europe less attractive for global talents. According to the European Commission, only 14 out of 27 Member States offer tailored startup visas, with highly variable requirements and success rates. Italy is one of the countries having a startup visa program. Launched in June 2014, Italia Startup Visa is aimed at non-EU entrepreneurs who want to establish an innovative startup in Italy. Through the procedure, talents from all over the world

can obtain a 1-year self-employment visa for Italy, freely renewable at expiration if the startup is still running.

Furthermore, the interview with *MrCall* identifies another crucial problem. With the Gentile Reform (1923) of the Italian education system, humanism was established as the cornerstone of education, putting the scientific subjects aside. Professions such as the notary profession excel in Italy, while scientific areas are seen as secondary. This leads to missed opportunities and a lack of sensitivity of the direction in which technological transformations are heading.

For what concerns human capital development, there are several indicators showing how Italy lags behind with respect to its major European peers. Low educational attainment, and low adult participation in education and training, weighs on the country's workforce skills. This contributes to weak labour productivity with substantial regional disparities<sup>26</sup>. Italy's firms dedicated only 6.4% of total investment to research and development between 2000 and 2019, well below Germany (12.1%) and France (9.7%). Nevertheless, by looking at data, it is important to keep in mind that Italy labour market possesses a large share of small and medium sized enterprises (SMEs), investing relatively lower resources in research and development.

Moreover, maintaining and increasing human capital also relies upon the capacity to build competencies in innovative fields, in tune with technological changes. This seems to reflect that the most competitive sectors are less attractive to Italy's students. There are still too few graduates in the ICT sector and low training in the field. Despite the investments to close the “digital divide”, according to the *Digital Economy and Society Index (DESI)*<sup>27</sup> of 2022, Italy ranks 18th among the 27 EU Member States. Despite the hard work to close the gap with the European average, more than half of Italian citizens do not even have basic digital skills.

Labour market segmentation and weaknesses in job quality remain major challenges. Italy presents a high incidence of atypical and fixed-term contracts, particularly among women, young people, and migrants. Over the last decade, while labour productivity has stagnated,

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<sup>26</sup> DPRS Morningstar Report on “Italy's Human Capital: A Key Social Factor for Economic Development” (2021). Available at <https://dbrs.morningstar.com/research/381313/italys-human-capital-a-key-social-factor-for-economic-development> .

<sup>27</sup> Available at <https://digital-strategy.ec.europa.eu/en/policies/desi> .

nominal wages have risen less than inflation; as a result, real wages have declined. In 2024, the share of workers who are at risk of poverty was higher than the EU average, including for both full-time and part-time workers. Taken together, low wages and widespread non-standard forms of work discourage labour market participation, reduce the attractiveness and quality of jobs and drive many young graduates to emigrate in search of better employment and wage prospects abroad. Furthermore, the employment gap between genders is one of the widest in the EU, at 19.4 percentage points, and has shown no signs of improvement over the past decade.

As a result, talent attraction and retention need to be incentivised both in Italy and in Europe. The EU *Startup and Scaleup Strategy* suggests initiatives such as stock option reforms and industry-university collaboration. In addition to this, the EU must also improve its digital education programs and simplify harmonisation of startup visas across Member States. By implementing these measures, Italy and the EU could significantly enhance its competitiveness and secure a sustainable pipeline of startup talent.

*Innovup* supports as one solution the Employee Stock Options (ESOs). These are a crucial tool used by startups to attract and retain talent, especially in competitive sectors such as technology and deep tech. These tools could represent a key factor in enhancing their competitiveness with higher salaries offered by large international corporations. However, the complex European regulatory and financial framework, results in a low general understanding of how ESOs work and their real benefits. The challenge for startups lies in their net present value being null, unless the companies go public and shares can be sold after the vesting period.

To maintain the effectiveness of stock options as a retention and recruitment instrument, these incentives should be extended to larger companies. Alternatively, the eligibility criteria for obtaining Innovative SME status should be reviewed to include bigger companies that make significant investments in R&D. By expanding access to these incentives, more businesses could leverage stock options to attract top-tier talent and foster long-term employee engagement.

Lastly, to pursue the process of closing the Gender and Generational Gap it is crucial to move beyond superficial initiatives and implement impactful measures. In this sense, discussions on addressing gender and generational disparities should be incentivised, with a focus on upskilling and talent competitiveness as key indicators. Concretely, inclusive educational

programs should be strengthened, starting from early education in primary schools, to promote equality and cultural inclusion from a young age. Cultural shifts are also essential to create a more equitable and competitive environment for everyone.

### **3.2.4 Insufficient technological transfer**

Technology transfer is considered as a key mechanism for driving innovation within businesses, where scientific structures play a leading role in enhancing the competitiveness of the national economic and industrial system by converting knowledge into innovative products, methodologies and services. During the literature analysis, the triple helix model underlines its importance. It claims a new institutional foundation for the development of innovation, which is no longer produced by a single institution, but instead by the triadic networking between the academic community, industry, and the government (Ranga, Miedema, Jorna, 2008). Technology transfer is one of the main elements that need to emerge from the correlation of the three institutional factors. Moreover, scholars identified it as particularly important in areas of high innovation, such as artificial intelligence (Ranga, Etzkowitz, 2015).

Italy ranks among the top 10% of countries whose scientific publications are among the most cited in the world. This confirms that research does not coincide with innovation and that the link between the two requires significant institutional intervention, different from that currently in place, which also considers the importance of building “intangible infrastructure”. The latest *Netval 2024 Report* is clear. In 2022, the costs of maintaining patents owned by universities and public research bodies amounted to €5.9 million, while the (uncertain) revenues from licence royalties amounted to €5.7 million. This is very little considering the 8,821 patents in the portfolio of 69 universities<sup>28</sup>. The reasons are related to the entire Italian industrial system. Italy is not prone to collaborate with the scientific world and, above all, is progressively reluctant to invest in R&D from outside its own company. Finally, the structural weakness of the Italian financial system also contributes to slowing down the process of technology transfer. All this has a domino effect on the value of industrial patent production.

Furthermore, a key issue is represented by the lack of a pro-innovation mindset in many universities, with insufficient incentives for researchers to commercialize their work. Legal,

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<sup>28</sup> Available at <https://netval.it/rapporti-netval/rapporto-netval-2024> .

organisational and financial frameworks for academic spin-offs vary across Europe, causing an uneven landscape across the continent. Additionally, the public procurement process in many EU countries is overly risk-averse, favouring established providers over startups. This limits access from startups to public contracts for innovative solutions. While in other countries large universities organise themselves by collaborating to create innovative sectoral spin-offs, thus allowing research and development activities to be channelled and become businesses, in Italy the model for exploiting innovation derived from university research remains tied to the bureaucratic system of the university, which is mainly public.

To foster a more cohesive innovation environment, the EU must encourage stronger interconnected ecosystems through greater support for universities, research institutions, and startups. The Unitary Patent System must be fully adopted by all EU Member States to reduce patent costs and facilitate the commercialisation of research. On the procurement side, the European Commission plans to revise and propose legislation and non-legislative measures concerning public and private procurement, which will also help supporting startups and scaleups by reducing possible barriers and encouraging innovation. By supporting intra-EU cross-border collaborations and simplifying access to procurement processes, the EU can create a more favourable environment for the growth and scaling of startups. To enhance collaboration between startups and corporates, strategic partnerships should be encouraged, making it easier for startups to secure their first customers and grow.

### **3.2.5 Fragmented regulatory environment**

The European Union accounts for one of the largest markets in the world with over 450 million citizens. Despite its substantial dimensions, when compared to other actors such as the US or China, the European market struggles to systematically produce Tech Champions. This is often attributed to the significant challenges faced by the EU's startup ecosystem in accessing foreign markets and, more critically, in navigating its fragmented 27 regulatory frameworks. The lack of harmonisation across Member States creates inefficiencies, making it difficult for young and innovative startups to expand beyond their domestic market and often leads to a preference for larger non-EU markets. As suggested by the literature review, the lack of clarity and predictability in regulation has been widely recognized as a growth inhibitor for startups.

Indeed, one of the key challenges is represented by complex and unharmonized regulations. The EU's fragmented regulatory environment forces startups to navigate different legal, tax, and administrative frameworks in each country. Unlike the U.S., where startups scale within a unified market, EU-based companies must comply with 27 different jurisdictions, increasing costs and administrative burdens.

The interview with *The Nettuniani* was crucial in underlying this problem. The co-founders of the startup, being not Italian, found it particularly confusing and challenging to navigate the Italian regulatory framework. Fragmentation, added to the linguistic barrier, is a main problem extending timelines and causing missed opportunities. Every region has its own calls and rules and it appears difficult to navigate the entire framework. Indeed, public support measures for startups are typically implemented in specific regional contexts and are often designed and executed by local authorities.

Startups encounter difficulties also in cross-border operations due to the absence of standardised legal and compliance documents. Each Member State requires different contracts, reporting standards, and tax filings, making expansion inefficient and resource intensive. Standard contract templates and a simplified EU rulebook would help alleviate these issues. The interview with the founder of *Brandplane* underlined that this represents a problem particularly in the post-funding phase. Italy faces a lack of standardisation because the ecosystem is too small and aligning all the incentives and interest remains complex.

Digital regulation complexity in data-driven businesses causes significant uncertainties and confusion due to inconsistent GDPR implementations across Member States and due to overlapping requirements between GDPR, the Digital Services Act, the Digital Markets Act and the AI Act. More specifically the introduction of the AI Act raises concerns as its requirements may conflict with existing GDPR principles for data processing. Nevertheless, the interviews reflected on the relevance of having regulation in sensitive fields such as AI. The co-founder of *Lexhero* highlights that regulation is essential for the protection of fundamental rights and to regulate competitiveness across the whole ecosystem. Data extraction and manipulation, if left unchecked, can lead to harmful and unethical practices. Creating an effective regulatory framework is necessary to balance innovation with rights protection.

Moreover, as emphasised in the interview with the co-founder of *Lexhero*, a recurring problem with legislation in the field of technology regulation, illustrated by examples such as the GDPR

and the Digital Market Act, is that legislation lags behind technological developments, risking becoming a constraint on the European ecosystem. Often there is too much distance between the legislator and the people developing innovative products. This leads to rules that are theoretically almost inapplicable for those working directly with AI.

To foster a thriving digital ecosystem, as recommended by the Letta Report on the future of the European Single Market, the 28th regime should be designated to enable young and innovative companies to operate across the European Single Market without encountering the barriers posed by 27 fragmented national legislations. Establishing a harmonised legal framework would allow European Startups to scale efficiently, to secure investments more easily and to compete globally. By reducing national discretions, the 28th Regime would ensure a unified framework and would serve as a European brand for innovation, enhancing the credibility and attractiveness of businesses.

The benefits that the European innovative ecosystem could have from the 28th regime are wide-ranging. By reducing legal fragmentation and compliance burdens, startups could redirect resources towards recruiting top talent, funding R&D, and increasing global competitiveness. The regime would also simplify cross-border investments, making it easier for venture capitalists and business angels to invest across the EU. Additionally, a 28th regime would enhance Europe's ability to create global tech champions, reducing reliance on non-EU markets.

Another element considered essential by the respondents to reduce the regulatory burden and enhance AI development is the effective use of regulatory sandboxes. Their importance, along with the need for implementing decrees in Italy, was underlined by both *Lexhero* and *Innovup*. Regulatory sandboxes are defined in Art. 3(55) of the AI Act<sup>29</sup> and they have the primary function of enabling the development of AI systems, in particular potentially high-risk AI systems, within a controlled environment. Startups and scaleups working with institutional customers, such as the European Commission and EU agencies, can benefit from establishing dedicated teams specialised in navigating regulatory sandboxes and engaging in policy

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<sup>29</sup> Regulation (EU) No 2024/1689 of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). Available at: <https://eur-lex.europa.eu/eli/reg/2024/1689/oj/eng> .

discussions to improve them. For companies where institutional clients are a key part of the business, internal expertise in regulatory compliance can provide a competitive advantage.

### **3.3 Discussion and key findings**

The analysis, supported by both existing literature and interview contributions, highlights several constraints affecting the Italian AI startup ecosystem. The scarcity of financing, especially of venture capital, is recognized as an obstacle to startup scalability, forcing promising startups to resettle in other more accessible markets. Despite the increasing interest of investors in artificial intelligence and deep tech products, Italian investors remain mostly risk-averse, often preferring tangible assets or more mature ventures. Another limitation for Italian AI startups is related to the size of support mechanisms and their lack of sectoral specialization. This also comes with a fragmentation of these instruments which results in missed opportunities for AI startup founders. A bottleneck of the Italian startup ecosystem is also identified in talent retention and a severe lack of digital skills, making it increasingly difficult to sustain innovation and support the growth of high-tech sectors. Furthermore, technological transfer is constrained, confirming that research does not coincide with innovation. Lastly, regulatory fragmentation, both inside Italy and across EU Member States, makes it compelling for startup founders to navigate the legislation.

Nevertheless, the qualitative analysis conducted highlights aspects that have been overlooked by international contributions and are crucial in understanding why Italian startups, particularly those active in AI, are unable to scale up. In Italy, the dynamics of innovation cannot be explained solely by the elements identified previously as these often emerge from analysis in mature ecosystem, such as the US, UK or Israel. Italy represents a unique scenario with a relatively young and still-developing ecosystem, which has not yet reached the level of maturity observed in many countries. Therefore, the following section will highlight some additional elements, emerged during the interviews, that help explain the constrained dynamism of the Italian AI startup ecosystem, going beyond the general factors discussed previously. Specifically, it addresses: the role of CDP Venture Capital as an infrastructure builder, the growing importance of equity crowdfunding in financing AI startups, the problem of the fragmented Italian governance, and the implications of the demographic crisis.

### **3.3.1 CDP Venture Capital as an ecosystem builder**

Since the establishment of Cassa Depositi e Prestiti (CDP) Venture Capital in 2020, the Italian startup ecosystem has experienced a significant change. CDP Venture Capital has gradually emerged as an innovation infrastructure builder, filling the gaps of the domestic innovation landscape. It introduces not only venture capital and corporate venture capital (CVC) initiatives, but it also establishes a comprehensive network of incubators and support mechanisms aimed at backing startups throughout their growth journey. Moreover, CDP Venture Capital provides hubs for technological transfer, which are crucial to systematize startups with universities and research centres. Overall, the intervention of CDP Venture Capital has contributed to a remarkable increase in funding opportunities and professionalization of the market, helping to address structural weaknesses in early-stage financing.

Mazzucato's theory (2011) on the Entrepreneurial State already underscored the proactive role of the State as a driver for innovation, demonstrating how public investments are crucial for the creation of new markets and technologies. Therefore, the State does not limit itself to "fix" the existing market, but it creates and defines new ones by financing the early stages of the development of new products and technologies. The Italian case, as emerged from the interviews to AI startups, suggests that in younger ecosystems, public actors must assume the role of infrastructure builder. CDP Venture Capital does not simply act as a financier. It creates institutional trust, reduces perceived risk, and lays down the infrastructural conditions that private actors alone are unable to provide. Moreover, public intervention is not generic but strategically oriented to sectors considered as priority, such as artificial intelligence and cybersecurity.

Analysing CDP Venture Capital's contribution to the Italian venture capital landscape, dynamics are not comparable to the traditional models in international literature on venture capital and risk culture, referring mainly to contexts where mature financial markets are driven by private investors and characterised by a high inclination for risk (Pratch, 2005; Kaplan & Lerner, 2010). For instance, the US VC market is the largest globally, with stable growth, but government

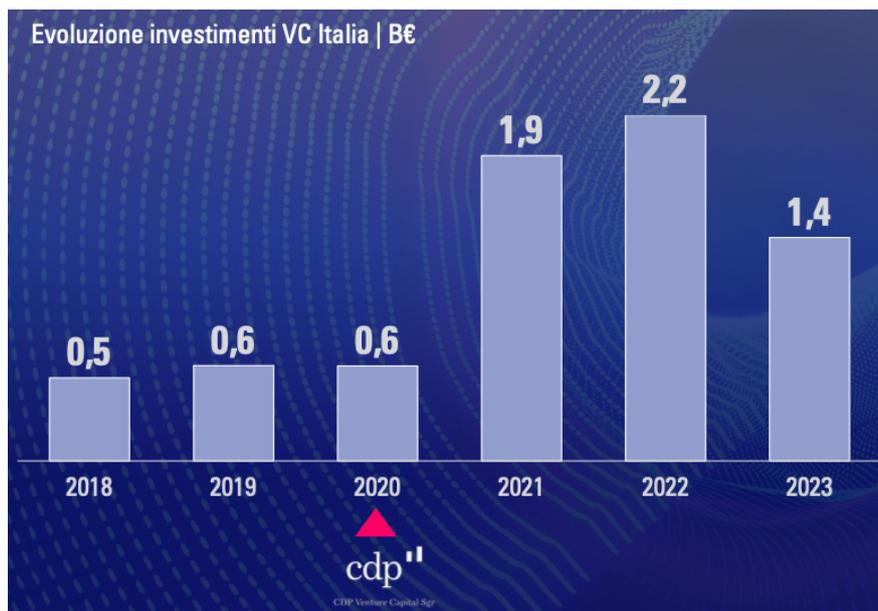
involvement is limited, with only 3% of deals<sup>30</sup>. In the Italian case, on the other hand, the market alone is not able to produce the incentives and volumes necessary to support innovation, especially in resource intensive markets such as the one of artificial intelligence. Therefore, the public sector acts through financial and infrastructural efforts providing fundings, building trust and reducing perceived risk. It is possible to affirm that public venture capital in the Italian startup ecosystem is not a complementary player but a cornerstone, without which technological innovation would be structurally unattainable.

Moreover, CDP Venture Capital contributes in filling the gap of risk-taking culture in investors. Researchers conceptualized entrepreneurial orientation as consisting of three primary dimensions: innovativeness, risk-taking, and proactiveness (Covin & Slevin, 1989; Miller, 1983; Miller & Friesen, 1982). Indeed, startups are, by definition, risk-taking operations. They must compete with giant firms which are better funded and more firmly entrenched, making the culture of risk-taking a catalyst for organizational progress. In Italy, as emerged from the interviews, risk-taking culture remains limited and a persistent risk aversion among private investors significantly hinders the financing of high-tech startups, particularly in their early stages. Italian investors often prefer ventures linked to tangible assets or more traditional sectors, leaving innovative startups with limited access to capitals. Here, CDP Venture Capital intervenes as a gap-filler, actively supporting early-stage investments and reducing the perceived risk for co-investors. In doing so, CDP Venture Capital builds the conditions for a more dynamic risk-taking environment, compensating the cultural and structural barriers that characterize the Italian ecosystem.

The contribution of CDP Venture Capital to the Italian startup ecosystem can be shown by data. The following graph illustrates the growth trajectory of venture capital in Italy since CDP's entry into the market.

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<sup>30</sup> OECD. (2025). Benchmarking Government Support For Venture Capital – Country Notes: United States. Available at: [https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/benchmarking-government-support-for-venture-capital-country-notes\\_2cacbf3f/united-states\\_b20863d0/444b0f19-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/benchmarking-government-support-for-venture-capital-country-notes_2cacbf3f/united-states_b20863d0/444b0f19-en.pdf)



Fonte: Piano Industriale 2024-2028 CDP Venture Capital Sgr

As underlined by *Innovup*, the Italian ecosystem remains relatively young compared to other European ecosystems: it was created in 2012 with the *Decreto Crescita*. Nevertheless, its high growth rate suggests strong scalability potential, and much of this momentum can be attributed to CDP's proactive role. Particular attention should be given to the AI sector since the *New Business Plan 2024-2028*<sup>31</sup> presented by the company targets AI as a new priority area for investments. Indeed, it allocates €1 billion to support the development of Italian AI, including €120 million for technology transfer, €580 million to support startups with vertical applications and €300 million for Italian AI champions. Through the implementation of targeted funds for technology transfer, vertical AI applications, and the attempt to create national AI champions, CDP Venture Capital fosters innovation while aligning with broader European objectives on digital transformation and sovereignty.

### 3.3.2 Equity crowdfunding as a new way of financing

Traditional entrepreneurial ecosystem theories (Isenberg, 2011; Stam, 2015) attribute to venture capital the primary role for financing startups. The literature often identifies equity crowdfunding as a marginal instrument unable to replace the strategic and network support provided by venture capital or angel investors (Belleflamme et al., 2014). However, evidence

<sup>31</sup> Available at [https://www.cdpventurecapital.it/resources/cms/documents/PianoStrategico\\_2428.pdf](https://www.cdpventurecapital.it/resources/cms/documents/PianoStrategico_2428.pdf).

from the Italian case, which is the second leading market in Europe for equity crowdfunding, indicates that it is becoming a significant component of startup financing, particularly in an ecosystem characterized by scarce venture capital. The harmonization established with the ECSP (European Crowdfunding Service Providers) regulation suggest that equity crowdfunding is shifting from a peripheral instrument to an institutionalized financing mechanism. This further challenges the assumption that private venture capital is the main instrument to sustain innovation in high-tech sectors and highlights the importance of considering alternative channels when analysing startup ecosystems in financially constrained countries.

Equity crowdfunding is a financing method allowing investors to invest in innovative startups and SMEs in exchange for company shares. It has proved to be one of the most valuable tools for democratising access to capital, especially for startups. In 2024, the sector achieved significant results driven by the implementation of the ECSP regulation, which initiated a process of harmonisation of the European Community market. This is confirmed by the *European Equity Crowdfunding Landscape 2024*, the first pan-European market report, produced by *Over Ventures* with the support of *Italian Tech Alliance*<sup>32</sup>. With 318 successful campaigns and total funds raised exceeding €248 million, the European market moves towards a recovery trend, becoming more competitive and attractive to retail and institutional investors. The ECSP regulation, which came into force in November 2023, has removed many barriers to cross-border financing, promoting access to more diversified capital for European startups.

Nearly 50% of companies engaging in equity crowdfunding are startups. Even though SMEs using this alternative financing tool are growing, it results particularly suited to the characteristics and needs of startups. Young companies with low initial valuations but high growth potential, coupled with flexible corporate structures and the need to build strong networks of customers, partners and investors, can maximize the benefits from equity crowdfunding. After France, Italy is the second country in Europe in terms of capital raised, with almost €24 million. In the first semester of 2025, European equity crowdfunding totalled approximately €160 million raised by startups and SMEs through 202 public campaigns. These are significant figures considering that the single European crowdfunding market was only recently established.

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<sup>32</sup> Available at <https://eecl.eu/>.

The European market is therefore showing signs of solid and widespread growth, according to *Over Ventures*, with around 40,000 investors involved. The average amount of the rounds stands at €778,000, with a median value of €530,000. The forecast for the end of 2025 brings the total potential volume to over €300 million (+26% on 2024) with over 400 campaigns (+27% on 2024). France remains the major European market in terms of capital raised, with over €60 million in the first half of the year, followed by Italy with around €24 million, the Netherlands with €18.5 million, Spain with €15 million and Ireland with €8 million. From a sectoral perspective, artificial intelligence is accelerating its impact in the crowd sector, following trends already visible in venture capital. If these trends continue to persist, the market will not only consolidate its role in the financial landscape but also become a key catalyst for innovation and economic growth in Europe.

### **3.3.3 Political engagement and the absence of a “thinking head”**

Debates on the startup ecosystems usually focus on capital and ways of financing, neglecting a systemic crucial aspect: the governance and, in the Italian case, the absence of a unified control room. Indeed, since the 1990s, Italy's position at the forefront of technology has gradually declined (Giunta & Rossi, 2017). The issue of supporting innovation and research has gradually fallen down the list of strategic priorities for almost all governments in recent years. Three fundamental aspects have emerged underlying the evident lack of political interest in the issue of innovation. The first is organisational pluralism, resulting from the proliferation of public actors called upon to play a role in the innovation chain. The second is, within this pluralism, the presence of a rather hierarchical approach, which leads to ministries, and among them especially the Ministry of Education and Merit, being assigned a dominant role. The third, which is closely linked to the previous one, is the weakness or absence of autonomous bodies, other than ministerial actors, that can play an active role in developing policy instruments.

Organisational pluralism emerges as a particularly problematic theme. In the current context, beyond the Government and Parliament, numerous ministries, together with the regions, contribute to determining the strategic development of innovation and research, and then to their concrete implementation. In broader terms, what appears to be missing is a “thinking head”, not only in terms of innovation and research but also in terms of industrial policy (Viesti,

2016), since the former cannot develop without attention to the latter. Added to this is the total absence of important independent agencies for financing and implementing research, such as the Fraunhofer or Catapult centres in Germany and England, which are able, through networking and a bottom-up approach, of ensuring technology transfer to industry.

Looking at Europe, during the 1990s, there was a shift from the paradigm of public support for research and development to that of national innovation systems (Lundvall 1992; Nelson 1993). Public policy was recognized as essential for the creation of an environment where firms can turn knowledge into marketable innovations. As a result, multiple offices with significant expertise in innovation policy have been developed within the European Commission: DG GROW, for example, has expertise in the protection of intellectual property rights and support for businesses; DG REGIO deals with regional programmes; DG COMP deals with competition issues; DG RTD is responsible for research, science and innovation policies. However, these attempts did not overcome the historical fragmentation of competences, which is also contributed to by the variety of executive agencies responsible for managing individual programmes.

Some European countries have successfully adopted governance measures aimed at supporting innovation. In Sweden, for example, the National Innovation Council, chaired by the Prime Minister, was introduced in 2015 and is recommended as a model for other countries (Edquist 2019). Moreover, Germany demonstrates how a coordinated approach works in practice: the High-Tech Strategy, launched in 2006 and then updated over the years, aligns innovation with societal challenges while promoting digitalization. Together with instruments such as the High-Tech Gründerfonds and the ZIM programme for SMEs, these initiatives underpin Germany's leadership in the European Innovation Scoreboard. France as well, historically marked by technological Colbertism, has modernized its dirigiste approach. Policies adopted during the Macron presidency, such as the "France 2030" plan, mobilizing over €54 billion for AI, semiconductors, hydrogen, and batteries, have sent strong signals of political commitment. AI has become central to France's industrial strategy, with major investments announced under the "Choose France" initiative<sup>33</sup>.

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<sup>33</sup> Available at <https://www.info.gouv.fr/grand-dossier/france-2030-en/understanding-france-2030> .

The analysis reveals that, in the Italian startup ecosystem, the core barrier is the absence of an integrated governance model capable of strategic coordination. Fragmented governance, coupled with cultural inertia, make policy instruments alone insufficient to overcome Italy's structural weaknesses. The fragmentation also renders EU initiatives, especially on AI, less effective since they are dispersed across multiple actors. This finding, emerging from respondents' perspectives, highlights that without an independent governance body, a true "thinking head" with monitoring and coordination powers, Italy's innovation policies risk remaining dispersed and short-term. This contribution moves beyond financial issues by framing governance architecture as a critical enabler for scalability in AI ecosystems, a perspective often underexplored in the literature.

### **3.3.4 Demographic crisis and entrepreneurial renewal**

As discussed previously, Italy faces difficulties in retaining talent and its underinvestment in education and R&D represent a significant barrier to the well-functioning of the AI startup ecosystem. However, an element that emerged from the interviews, overlooked by the literature, is represented by the progressive aging of the entrepreneurial class. While the scarcity of skilled human capital limits the supply side of innovation, an aging leadership restricts its demand, in fact older generations tend to display lower risk appetite and less familiarity with disruptive technologies.

Italy is one of the Member States with the oldest population, the lowest birth rate and a higher-than-average age of women giving birth to their first child. The migration balance remains positive but no longer offsets the low birth rate. As a result, the working age population continues to shrink, limiting potential growth. Moreover, over the last ten years, the proportion of entrepreneurs over the age of 70 has risen from 16.9% to 25.5%, while leaders under the age of 50 have fallen from 31.3% to 18.7%. Furthermore, only 13% of family businesses manage to survive beyond the third generation, and just 1% reach the fourth.

Data show a generational gap which appears particularly problematic in the field of high-tech and artificial intelligence, which are sectors deeply rooted in digital-native cultures and agile organizational models, elements often distant from the mindset of traditional, family-run

businesses. The result is a structural misalignment: even when young talent emerges, it struggles to find entrepreneurial sponsors and an ecosystem ready to absorb and scale innovative ideas.

### **3.4 Conclusion**

The chapter outlined the analysis and discussion shedding the light on the interaction between enabling and constraining factors that shape the scalability of AI startups in Italy. While the analysis section confirmed several structural barriers, already emerged from the literature review, such as limited access to financing, lack of specialized human capital, low expenditures in R&D, inadequate technology transfer, and regulatory fragmentation, the discussion section tried to go further by uncovering new variables that enhance the understanding of the Italian ecosystem.

The first point of the discussion is centred on the role of CDP Venture Capital, which was identified as an ecosystem builder, illustrating the increasing importance of public actors in filling the market gaps and in shaping a more cohesive entrepreneurial environment. The second aspect referred to the rising of equity crowdfunding as an alternative way of financing, which highlights how new paths are beginning to provide opportunities for startups, challenging traditional models of investment. Third, the absence of a “thinking head” reveals a governance gap, resulting in the lack of a unified strategic vision for AI innovation. Finally, the relation between demographic crisis and entrepreneurial renewal underscores how societal trends intersect with innovation dynamics, questioning the long-term sustainability of ecosystems placed in nations marked by population decline.

Identifying these variables, the thesis contributes both to a more precise understanding of the Italian AI startup ecosystem and to the broader theoretical debate on the scalability of entrepreneurial ecosystems. The chapter offers valuable insights for scholars and policymakers interested in reviving innovation and competitiveness in the Italian startup ecosystem. As the global race for AI intensifies, Europe’s competitiveness will depend not only on its financial and technological investments but also on designing an effective governance that is able to reflect its unique socio-economic realities. Italy’s path reinforces the idea that the future of AI in Europe will be shaped by the ability to align structural reforms with societal transformations.

## Conclusion

The thesis has sought to provide a comprehensive understanding of the Italian startup ecosystem with a specific focus on the artificial intelligence (AI) industry. Original interview material, coupled with the existing literature, has proved that Italy represents a unique case in the international landscape of entrepreneurial ecosystems. While the main structural barriers identified mirror those observed in the existing literature on other countries, the Italian experience reveals peculiar dynamics, allowing to understand why AI startups continue to struggle in scaling.

The findings confirm the persistence of structural limitations that hinder the development of high-tech ventures in Italy. These barriers were also identified in the literature and were used as the main variables for the analysis. A primary constraint is represented by limited financing opportunities, particularly the scarcity of venture capital. Indeed, due to risk aversion among domestic investors and the preference for traditional sectors or tangible assets, innovative startups are often obliged to look abroad to find the resources necessary for growth. Similarly, the limited availability of specialized support mechanisms, and their fragmentation, prevents the consolidation of an innovation pipeline able to accompany startups towards growth. Moreover, the lack of adequate digital skills, weak technological transfer, and regulatory fragmentation further compound these difficulties.

Yet, limiting the analysis to these structural barriers, common in the literature on more mature and investigated ecosystems, provides a partial explanation of the Italian case. Italy's startup ecosystem, and particularly its AI segment, is still relatively young, considering that it was created in 2012 with the first *Startup Act*. Understanding its development trajectory requires a closer look at context-specific dynamics that influence how startups emerge and attempt to scale. By integrating interviews into the analysis, the thesis has identified four additional variables that are able to expand the explanatory framework: the role of CDP Venture Capital as an ecosystem builder, the growing importance of equity crowdfunding as a way of financing, the consequences of fragmented governance and of a scarce political engagement, and the demographic challenges that constrain entrepreneurial renewal.

The first variable highlights the importance of public actors in the Italian context. In contrast to more mature markets, where venture capital is mainly driven by private actors, the Italian case demonstrates the need for state intervention. CDP Venture Capital emerges not only as a financial provider but also as an institutional architect, building trust, fostering technology transfer, and orchestrating a network of incubators and accelerators. Its intervention and the strategic prioritization of AI underline the proactive role of the state as theorized by Mazzucato (2011) in her work on the Entrepreneurial State. CDP Venture Capital action is not limited to fill the market gaps, but it is effectively shaping the conditions under which markets for AI innovation can exist. Therefore, finding suggests that in young ecosystems, state-driven venture capital is not merely complementary but foundational.

The rise of equity crowdfunding, which challenges traditional assumptions about financing in entrepreneurial ecosystems, is the second emerging factor of the analysis. Italy ranks as the second European country for equity crowdfunding, and it appears as particularly relevant in contexts where private venture capital is scarce. The recent ECSP regulation and the growing involvement of investors indicate to a broader European trend in which equity crowdfunding is becoming a legitimate and powerful financing channel. This development underscores the need to rethink theoretical models that place venture capital at the centre of startup growth, especially in financially constrained environments.

The third element is represented by the absence of a “thinking head” in Italy’s innovation governance, which represents a critical weakness that transcends financial considerations. The fragmentation of responsibilities across ministries, regions, and local agencies results in a lack of strategic coordination, which diminishes the effectiveness of both national and European initiatives and ends up in missed opportunities for startups. Unlike countries such as Germany, Sweden, or France, which have institutionalized mechanisms for aligning innovation policy with broader industrial strategies, Italy remains without a unified governance body capable of steering long-term priorities. This structural deficiency undermines policy coherence and weakens Italy’s capacity to position itself competitively within the European and global AI landscape.

Lastly, the demographic crisis, combined with the decline in entrepreneurial renewal and the shrinking pool of working-age talent, poses significant constraints on innovation capacity. The interviews revealed that the generational gap affects not only the supply of skilled workers but

also the demand for innovation, as older generations of entrepreneurs often lack familiarity with disruptive technologies. The convergence of demographic trends and innovation dynamics illustrates how broader societal shifts can directly influence the vitality of entrepreneurial ecosystems.

These findings contribute to both empirical and theoretical debates. Empirically, the thesis sheds light on the Italian AI startup ecosystem through a combination of structural factors and context-specific variables, overlooked in international studies. Theoretically, it enriches the literature on startup ecosystems illustrating how public intervention, alternative financing mechanisms, governance structures, and demographic dynamics interact in shaping the prospects of high-tech startups in less mature ecosystems.

The Italian AI startup ecosystem is confronted with substantial challenges but also demonstrates considerable potential. Its rapid growth since 2012, combined with the transformative role of CDP Venture Capital and the emergence of new financing instruments, indicates that Italy is far from static. Rather, it is a dynamic ecosystem in transition, whose future trajectory will depend on the capacity of policymakers, investors, and entrepreneurs to address its structural weaknesses and leverage its unique strengths. As the global race for AI leadership intensifies, Europe's competitiveness will depend not only on its financial and technological investments but also on designing an effective governance that is able to reflect its unique socio-economic realities. Italy's path reinforces the idea that the future of AI in Europe will be shaped by the ability to align structural reforms with societal transformations.



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# **Annex – Interview Guide**

## **I. Introduction**

Objective: Understand the profile of the startup and its founders.

- What stage is your startup currently at (e.g., seed, early growth, scaleup)?
- What technologies do you develop?

## **II. Access to capital**

Objective: Explore experiences with financing and access to investors.

- What has been your experience in obtaining financing?
- What types of financing have you had access to?
- Do you believe that the availability of capital in Italy is sufficient to support AI innovation?

## **III. Talent and human capital**

Objective: To understand the challenges related to hiring and talent development.

- How easy or difficult is it to find qualified professionals in AI and related fields in Italy?
- Do you collaborate with universities or research centres?

## **IV. Support mechanisms and infrastructure**

Objective: Evaluate incubators, accelerators, and technological infrastructure.

- Have you participated in any incubators or accelerators? Which ones? How useful were they?
- Are there enough support programs or startup hubs in Italy specifically focused on AI?

## **V. Ecosystem interconnection and networking**

Objective: Investigate connections with other players and internationalization.

- Do you collaborate with other startups, companies, or institutions (such as universities, research centres...)?
- Is there a strong network or community around AI startups in Italy?

- Are you seeking to internationalize, and if so, what challenges have you faced?

## **VI. Regulation and bureaucracy**

Objective: To assess how regulatory frameworks influence the development of AI startups in Italy.

- Which were the bureaucratic obstacles (e.g., licensing, compliance, data governance) that have slowed most your development?

- How clear or unclear do you find the Italian regulatory framework for AI-related technologies (e.g., data use, algorithms, liability)?

- Have national or European regulations (e.g., GDPR, AI Act) had an impact on the development of your products or your business model?

- Do you believe that policymakers understand the specific needs of AI startups?

- In your opinion, what regulatory changes or simplifications would be most beneficial to your company?