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Small and Medium-sized Enterprises and Innovative Startups: an unexplored relationship

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ABSTRACT

A multiplicity of connections and relations are verified among the different actors involved inside entrepreneurial ecosystems (EEs). So far, academic literature has poorly deepened into this thematic, notwithstanding the strong impact that EEs have on birth and growth of new ventures and on economy of countries. This work contributes to fill this gap, by examining the importance of collaboration between small and medium-sized enterprises (SMEs) and innovative startups in a context of entrepreneurial innovation. In particular, a descriptive analysis is proposed concerning these relations inside Italian Industrial Districts (IIDs), through the study of geo-proximity of new ventures in the Italian territory and of industry relatedness. We discovered a significant presence of innovative startups inside and closed to IIDs, where a strong manufacturing characterization and high concentration of SMEs exist. Although no relevance has been found on industry relatedness between districts specialization and startups sector of activity, we can interpret these results as a possible indication of the importance of relationships between SMEs and startup. For this reason, the thesis also proposes the study of a collaboration case between a medium enterprise and a startup both operating inside the Paduan district, to point out which practices have been adopted by the two organizations and which key factors made the collaboration succeed.

ABSTRACT – ITALIAN VERSION

All'interno degli ecosistemi imprenditoriali si concentrano una molteplicità di connessioni e relazioni tra i diversi attori coinvolti. La letteratura accademica ha fin ora approfondito poco questo tema, nonostante il forte impatto che gli ecosistemi imprenditoriali hanno sulla nascita e la crescita di nuove imprese e sull'economia stessa dei Paesi. Questo lavoro contribuisce a riempire questa mancanza all'interno della letteratura, approfondendo l'importanza delle collaborazioni tra PMI e startup innovative in un contesto di innovazione imprenditoriale. In particolare, viene proposta un'analisi descrittiva riguardo queste relazioni nei Distretti Industriali Italiani, tramite uno studio di geo-localizzazione delle nuove imprese innovative sul territorio italiano e di corrispondenza settoriale. Abbiamo riscontrato una presenza significativa di startup innovative all'interno e nei dintorni dei distretti industriali italiani, ovvero laddove vi è una forte caratterizzazione manifatturiera e alta concentrazione di piccole e medie imprese. Nonostante non sia stata trovata una rilevante corrispondenza tra specializzazione distrettuale e settore di appartenenza delle startup innovative, possiamo interpretare tali risultati come possibile indicazione dell'importanza delle relazioni tra PMI e le startup stesse. Per questo motivo il lavoro propone anche lo studio di un caso di collaborazione tra una media impresa e una startup operanti nel distretto padovano, per cercare di indicare quali pratiche siano state adottate dalle due aziende e quali sono stati fattori determinanti per far sì che la collaborazione si rivelasse un successo.

EXECUTIVE SUMMARY

Introduction

The objective of this chapter is to introduce the role of the collaborative practices performed by companies inside entrepreneurial ecosystems (EEs). EEs point out that entrepreneurship takes place thanks to the dynamic and evolving set of interactions involving individuals, organizations and governmental bodies inside a specific territory. So far, studies addressing this topic focused on the role of incubators, universities, financial providers, large enterprises and their impact on new venture creation and entrepreneurship support. All these actors contribute to create the conditions for long-term entrepreneurial success if effectively engaged and interacting with new ventures.

In particular, several studies highlighted the importance of collaboration between firms, as support for innovation inside already established companies and creation of new ones. Nowadays, the reduced cost and increased velocity for development of technological novelties push companies toward a more collaborative approach, especially with startups, to reduce risk of being disrupted by competitors able to gather opportunities and bring to the market innovative products faster.

Therefore, by concentrating on collaborations with other firms, literature has mainly addressed large technology-based companies. The typical approach adopted by this kind of organizations is opening boundaries to innovative startups, since they lack of managerial and financial resources, relying into large firms as a great source of the latter. Instead, small and medium-sized enterprises (SMEs) have been poorly taken into account when dealing with open innovation, notwithstanding they largely collaborate with other SMEs through informal alliances to survive and innovate.

This work tries to contribute to the advancement on knowledge about how SMEs collaborate each other and which role they cover inside EEs. First of all, the thesis analyses geo-localization and industry proximity between traditional SMEs and innovative startups through an empirical approach. Secondly, it has been decided to develop a study case of

collaboration between an innovative startup and a medium-sized enterprise, in order to reveal which drivers encourage companies to collaborate and the practices adopted by the two organizations to make the collaboration work.

Objectives and methodologies

This second chapter defines the objectives of the thesis, and two research questions are used to summarize the scope of the work and which analyses have been performed in order to give them an answer:

- Where is new venture creation fostered in Italy?
    - Description of how startups are distributed inside the Italian territory, with a particular focus on Italian Industrial Districts (IIDs);
    - Analysis of the drivers fostering new venture creation and proximity relatedness between startups and firms.
- How could collaboration between SMEs and innovative startups increase growth and innovation?
    - Description of the importance of collaboration for SMEs renewal and startup scaling;
    - Analysis of a successful collaboration case between a medium-sized enterprise and an innovative startup.

The following methodologies have been performed to answer the questions:

- Literature review: it has been necessary to better understand the topics debated and which parts have not already been covered by scholars;
- Analysis through secondary sources: to perform the empirical analysis external sources of data have been utilized. They have been taken as a starting point for further considerations about innovative startups localization and importance of districts in the Italian ecosystem;
- Interviews: we decided to integrate to the empirical analysis a collaboration case between an innovative startup and a medium-sized enterprise, to testify how

beneficial open innovation and partnership with innovative ventures could be for SMEs. Two interviews have been conducted to pursue this goal.

SMEs and Innovative Startups in EE

This part of the thesis aims to provide a scientific overview about the concept of entrepreneurial ecosystem (EE) and of Italian Industrial Districts (IIDs), which role SMEs and innovative startups have in this entrepreneurial context and why they should collaborate.

The systemic view of the EE assumes that birth and growth of new firms are impacted by a multiplicity of actors. EEs can be seen as a combination of social, political and cultural factors which combined can create fertile ground for startups creation and growth within a particular territory (Spigel, 2017). The main actors participating are startups and new firms, established organizations, financial providers, institution and public sector bodies (Mason and Brown, 2014). Isenberg (2011) identified six forces delineating the entrepreneurial ecosystem: culture, market, policy, finance, support and human capital. In particular, the interaction between companies can be incredibly profitable in terms of growth and innovation, and while the great incidence of large companies is consolidated between scholars, the same consideration cannot be made for SMEs, since this field of research is almost unexplored. Entrepreneurial ecosystems are strongly characterized by territory specificity. In a world where digital technologies allow to diminish distances in terms of communication and supply of technologies, information, capital sources and goods; at first sight we could deduce that location advantages are nullified. Instead, territory specificity already matters for accessing that resources really providing competitive advantage, since all the others that can be reached by potentially all the firms, at any time through digital technologies, lose their strategic dimension (Porter, 1998).

Following these lines of reasoning, a crucial role in the Italian landscape is constituted by Italian Industrial Districts (IIDs), that can be considered a peculiar kind of EE, populated by mainly small and medium-sized enterprises (SMEs), strongly characterized by a manufacturing imprinting (Becattini, 1991). The concept of agglomeration has origin from Marshall (1980), who identified how companies belonging to the same sector tend to locate

close to each other to facilitate knowledge exchange, decrease cost of transportation and benefit from a specialized labour market. These externalities are defined of specialization, and oppose to Jacobs (1969) view, who instead identified agglomeration based on diversification, affirming that heterogeneity fosters innovation and new venture birth through interactions across industries. Both the models tried to find correlation between their verification and new venture creation.

In this thesis, Italian Industrial Districts (IIDs) are examined as a third form of agglomeration dynamic that can potentially foster entrepreneurship. Becattini (1991) defined district local areas as "an agglomeration of many small enterprises inside narrowed areas, each of them specialized in a production phase, but at the same time infused with the others in a way that allows to constitute the manufacturing local chain". They are similar to Marshallian concept of agglomeration, but IIDs include all the companies participating to the whole distribution chain, and for this reason not necessarily belonging just to the same sector. Moreover, IIDs possess shared social and cultural values among the firms contained in them (Cavallo et al., 2018). In time IIDs have been subjected to a lot of transformation and changes. Born during the 1950s, it has been witnessed to their maximum splendour in the 1980s, in which they reached the maturity phase. They are mainly populated by specialized craftsmen and small and medium sized enterprises, operating in the *Made in Italy* sectors as textile, clothing, ceramic, goldsmithing and shoes (Belussi, 2015). The advent of digital and global competition threatened the advantages gained by IIDs, based on localization and *cognitive proximity*, an effect that is created when people and organizations are able to exploit a shared knowledge to improve their current business processes through a mutual exchange of information and practices (Boschma, 2005). SMEs internal to IIDs adopted different strategies to offset the competition from eastern countries, initially trying to reduce costs by adopting an internationalization strategy and localizing low value-added activities in low labour cost countries, or by attracting workforce from the middle-east of Europe. In time, however, cost-based strategy did not constitute a sustainable alternative, therefore they moved toward an approach of quality relying on the Made in Italy and more customer-driven. Nowadays high uncertainty persists around the future IIDs, from internationalization to reshoring strategies (Ferrucci and Picciotti, 2017).

To study IIDs in Italy, the analysis, relates to SMEs and innovative startups inside entrepreneurial ecosystems. Startups can be considered a particular typology of SME, but they are not always clearly distinguished by researchers. Even if they share many characteristics (e.g. informality and flat organization structure) there are elements that make these two kinds of organizations really different. First of all, they are originated from two distinct "waves of entrepreneurship". SMEs are typically born in the era started with the Taylorism and subsequently with the Lean Philosophy. Innovative startups instead have origin during the fourth industrial revolution, with the Internet and digital advent. The second main difference is connected to the scope that firms have and their propensity toward innovation. SMEs have a more local characterization and operate in traditional industries, typically sceptical about novelties; innovative startups are instead innovation driven and have the inherent ambition to scale fast and grow internationally.

Notwithstanding SMEs have a high rate of linkages with other organizations, the level of collaborations with innovative startups is sub-optimal. In fact, while startups are continuously seeking for external partners that could facilitate to reach the market with their novelties (Usman and Vanhaverbeke, 2016), SMEs are typically reluctant to innovation and more focused on optimizing their current business and processes, without assigning the right importance to renovate their business model.

However, this work tries to underline how startups and SMEs can successfully cooperate in the moment in which the right conditions are in place, since they possess complementary needs and resources that can be fulfilled by each other.

SMEs are typically focused on excelling in just few activities, so they tend to access information, expertise and technologies from external sources. At the same time, they usually try to avoid collaboration with large firms as they could limit their potentiality and independence. Therefore, they prefer to connect themselves with other SMEs or institutions as research centres and universities to gain greater benefits and synergies (Rothwell and Dodgson, 1991). The drivers fostering SMEs - startups included - to collaborate are (Franco, 2003):

- The need of innovation and organizational learning to remain competitive (Welbourne and Pardo-del-Val, 2009);

- To gain market power and facilitate international expansion;
- Risk sharing and reinforcement of production capacity;
- Resource dependence (especially for startups).

Moreover, the complementarities and similarities of startups and SMEs can favour a successful collaboration. These enablers consist in:

- Different scope and innovation propensity making the outcome of the partnership beneficial to both the organizations, without threaten the counterpart stability;
- Despite a more structured organization, the SME remains intrinsically flexible (Hudson et al, 2001), consistently with the openness and agility of the startup;
- SMEs place more value on relational capital than large firms do (Welbourne and Pardo-del-Val, 2009).

The combination of the incentives and the enablers between the two organizations show the potentiality that this type of cooperation can generate. In fact, the results can be very valuable, satisfying needs and increasing strengths of both the realities.

In particular, the main benefits resulting from a successful collaboration can be connected to the fact that traditional SMEs located inside IIDs have an international vocation in export activities, by successfully adopting an off-shoring strategy and creating an international subcontracting chain (Belussi, 2015). Thus, startups can be supported to purse their path toward internationalization. On the other hand, SMEs can greatly benefit from the innovative nature of startups and overcome their difficulties and barriers to innovate. In fact, highly technological and innovative solutions can help SMEs to undertake a path toward servitization, to optimize internal processes and find new ways to communicate their products to clients.

When the determinants for the engagement and the potential benefits have been described, it is also necessary to mention which difficulties could verify and prevent the collaboration to succeed. The hypothesis made in this paragraph is that the threats are comparable (maybe with a lower impact) to the ones occurring when dealing with a startup-corporate relation, since literature focused the attention to this kind of relationship so far. The main problems

arising have been identified in culture, complexity and communication issues (Oughton et al, 2013).

SMEs are reluctant to introduce innovation in their processes since preoccupied to burn resources; this collides with startup culture of experimentation and Agile approach. Complexity is instead related to the multiplicity of actors involved in the decisional process, who have different interests in the results. In more structured organizations these roles include all the people in charge of different functions, while in startups it is given by who own the control over the enterprise (founders, venture capitalists, business angels…). Eventually, different cultures imply different languages and ways of communication, implicating difficulties in understanding, mistakes and delays in deliveries.

In order to overcome or at least minimize these obstacles, the two enterprises should invest time for developing a mutual understanding of objectives and relational capital to better satisfy the partner needs. Following these lines of reasoning, the two organization should not focus on the agreement of monetary aspects (Oughton et al, 2013) but on how to deliver and create value. It is fundamental to identify few pivotal roles that perform as interface between the two organizations and can be considered a bedrock to refer to when problems arise. Moreover, if one of these pivotal roles for the startup has also already dealt with large realities in the past, the probability that the collaboration succeeds increases (Usman and Vanhaverbeke, 2016).

Empirical Analysis

The empirical analysis is based on the observation of how many innovative startups localize inside IIDs, where SMEs are mainly concentrated. In this way, indirectly, it is shown how the copresence of these two kinds of organization is beneficial for firms and economy of the territory. Basing on the idea that cognitive proximity happens when people share a common knowledge and expertise (Boshma, 2005), it is easy to associate a high level of cognitive proximity with a strong industry relatedness between firms. On the other hand, a low level of industry relatedness implies higher probability of complementarities.

In this chapter, the thesis aims to understand if innovative startups localize inside or in proximity of IIDs. Moreover, industry relatedness has been analysed between the sector of

specialization of IIDs and enclosed innovative startups. In this way, it is possible to assess a proxy for the level of cognitive proximity of startups inside the Italian industrial areas.

The analysis performed used external sources to create a classification of innovative startups basing on the position of their headquarter. The investigation considered 9931 enterprises, enrolled in the Innovative Startups' Register of the Italian Chamber of Commerce by the date 04-03-2019. They have been already classified by industry through the ATECO 2007 code, a classification of the economic activities assigning an alphanumerical combination, in which letters and numbers represent different level of details for the activities.

The first consideration that emerged from the analysis is that the largest majority of innovative startups belongs to three service-connected activities (i.e. Software Production & Computer Consultancy, Scientific R&D, Activities Of Information Services & Other Services). Therefore our analysis will be probably conditioned by a too generic categorization of the industry of belongingness. By employing also a classification, made by Eurostat, of economic activities by level of technology and knowledge intensity, we have also been able to detect how many startups are active in high-tech or high-knowledge intensity sectors. The sample of our database denotes that about 58% of innovative startups are inside the High Tech Knowledge Intensive Services class, and by including also the ones operating in Medium-High and High Tech manufacturing sectors, the portion of startups basing their operation on high level of technologies arises to almost 69% of the population.

After having observed what are the main activities performed by Italian innovative startups, a geo-proximity analysis has been performed to study how they are distributed inside the Italian territory. To carry out this study, the ISTAT (Italian Institute of Statistics) classification of Labour Market Areas (LMAs) has been adopted (La nuova geografia dei sistemi locali – ISTAT, 2015); where LMAs are defined as functional geographical areas which satisfy criteria based on labor demand and supply, with the purpose to maximize the social-economic spatial interaction. In this work they substituted the classic administrative boundaries (cities, provinces, regions), since better reflecting social and economic dynamics. In 2011, ISTAT identified 611 LMAs, of which 141 classified as Industrial Districts areas (D_LMAs). From a technical point of view, LMAs are functional regions obtained through the agglomeration of two or more municipalities.

This section shows how districts and startups are geographically distributed, by also displaying two maps for the distribution of startups in LMAs and inside D_LMAs. Additionally to the distinction made by ISTAT of "not district LMAs" (NO-D_LMAs) and D_LMAs, the thesis proposes two further configuration of districts. They represent the areas expanding D_LMAs across the directly contiguous municipalities, forming the "extended district LMAs-first crown" (DE1_LMAs), and next to the ones directly contiguous, the "extended district LMAs-second crown" (DE2_LMAs). The assessment of geo-proximity has been carried out by counting the number of innovative startups located inside each of these four categories of LMAs.

The second part of the empirical analysis studies the connection between IIDs sector of specialization and industry of activity of innovative startups. Again, to assess industry relatedness, ATECO code has been chosen, despite its limitations and simplicity. This work adopted two options to calculate correspondence in industries. The first method looked at the three district principal industries (DIP1, DIP2, DIP3) of D_LMAs (i.e. the three main groups of economic activities prevailing in each district). If at least one among these three codes correspond to the sector of the enclosed innovative startups, industry relatedness between them is accounted. The second method considered the set of ATECO codes extracted by studying the industry of the SMEs populating D_LMAs. Also in this case, if at least one correspondence verifies among the set of ATECO codes of SMEs, the startup is considered industry related to the D_LMA.

The empirical evidence section displays the results obtained by our analysis. First of all, there is relevance about presence of startups inside and around the area in proximity of IIDs. Numbers also underline a high importance of big cities inside NO-D_LMAs for what concerns new venture creation and presence; characteristic that is instead less relevant for D_LMAs, showing a greater homogeneity of startup presence among all municipalities contained in districts.

Industry relatedness does not show evidence of contiguity between sector of SMEs and innovative startups in D_LMAs (around 10% of correspondences), notwithstanding this method provides even better results compared to the one considering the three principal industries. It is possible to notice that data about relatedness remains consistent by extending D_LMAs to DE1_LMAs, while when referring to DE2_LMAs very poor level

of relatedness emerges in both the methods. This suggests that extending districts by including also second crown municipalities has low significance, very likely due to a too broad inclusion of municipalities which are not actually influenced by IIDs presence.

Collaboration case

In this chapter the description of the collaboration between a startup and a SME is shown. For the selection of the case, it has been opted for a small medium-sized enterprise born during the "first wave of entrepreneurship" which collaborated in partnership with an innovative startup exploiting digital technologies for the development of their solutions. Moreover, the choice had to be coherent with our empirical analysis to support the relevance of SMEs and innovative startups presence inside IIDs. The scarcity of academic researches about startup-SME collaboration issue is also reflected in the lack of known and reported case. The most remarkable case that we have found is the collaboration between the medium enterprise Bedeschi and the innovative startup Airlapp, both belonging to the Paduan industrial district.

Bedeschi Group is an engineering and production company of mechanical plants, active from 1908, with headquarter in Limena (PD). They have an international presence in United States and Dubai in addition to several representative offices across the world. The company is specialized in three main industries: material handling, bricks and cranes.

Airlapp is an innovative startup, born in 2016 in Piove Di Sacco, near Padova. Airlapp is a software house that studies an researches the most advanced mobile and web technologies, specialized in four main applications: augmented reality, virtual reality, native apps, web apps.

The collaboration has origin from a Bedeschi's need to better exhibit their machines and plants in fairs, since in that moment, very conventional means were used by the whole sector to expose to clients and stakeholders the installations (e.g. videos, photographs, pieces of gears or plant components). Bedeschi decided to seek for a partner that would have been able to transform ship-loaders of 70 meters into digitalized artefacts in few months, in time for the Jakarta exhibition. The collaboration revealed a success thanks to the virtual reality solution which brought a lot of originality to the trade show. From the

Jakarta exhibition, many other machines and plants have been replicated into their digital format.

To deeply understand the why behind the dynamics of the collaboration, two interviews have been conducted for analysing the collaboration case; the first to the Co-Founder and CEO of Airlapp, Antonio Longhin, the second one to the IT Manager of Bedeschi, Fabio Maggio. This approach allowed us to have a more complete view of the partnership.

Findings

The findings chapter is structured in a way that alternates some comments with the very words of the two persons interviewed (written in italic words). Moreover, it is subdivided into four sections dividing the origin, the management, the challenges and the impact of the collaboration.

As already mentioned, the collaboration is generated from a Bedeschi necessity, that is to find smart ways to bring installations and machineries to trade shows. The lack of competences led them to find an external partner capable to develop the solution they needed in a short time and they found in Airlapp the characteristics complying the best with Bedeschi requirements. The beginning of the collaboration represented the first challenge for Airlapp, since they were a new-born company and therefore, from the interview made to Airlapp CEO: "*We had very few things to offer, except for us as a group of people*". However, positive outcome emerged from the meeting, also thanks to the great capability to envision potentiality of innovation and the dynamism of Bedeschi CEO, Rino Bedeschi.

Once started the collaboration, Airlapp adopted software engineering philosophy for the development of each machinery, combining the Agile approach with Kanban techniques. The strong level of autonomy of Airlapp has been crucial for the collaboration success, also because Bedeschi was committed into many other projects and didn't have time and resources to follow the development step by step. Moreover, as highlighted by Bedeschi IT manager: "*It has been very important their enthusiasm, they really step in our shoes*". Another component favouring a stronger relation has been the geographical proximity that allowed faster communication in the moment in which important aspects were essential to be

defined or revised and when problems arose. Physical meetings also allowed the creation of a more personal connection and affinities, as the very word of IT manager: "*Even if we live in an increasingly connected world, I can notice that meeting in person repays. Maybe because non-verbal language enters the game and you can appreciate people much more than by simply doing a Skype call*".

Even in this success case, difficulties emerged for both the innovative startup and the SME. The main problem encountered by Airlapp is related to their dimension compared to Bedeschi. As aforementioned, Airlapp found difficulties to start and support a negotiation with such larger company. To overcome this difficulty it has been fundamental the figure of Fabio himself (Bedeschi IT manager) who acted as a point of contact between the two realities. On the other hand, Bedeschi found some threats in the lack of flexibility typical of large companies and also of many medium-sized companies similar to Bedeschi. Instead, the IT manager said: "*We succeeded in being agile and lean, we skipped any kind of filter... One of our key success factor is being much more flexible than many other competitors*". The other most relevant difficulty that Bedeschi encountered consists in not having any kind of control on what the counterpart was developing. Also in this case, they have been able to mitigate the risk of failure, through an honest rapport based on respect and the development of a more personal and participatory relation.

This case of collaboration provided advantages of very different kind to both the firms. For Bedeschi, the most obvious return is the economic one, since the digital solution developed allowed them to attract more clients to their stands and gain increase in sales. Moreover, they found in Airlapp a very talented partner that can bring them innovation in the ICT field also in the future, by means of new projects, even different from the virtual reality area.

On the other side, Airlapp has consolidated their software know how in the virtual reality filed, but they also gained an important reference and visibility. In fact, Bedeschi was so grateful with Airlapp for the great outcome of the relationship that they sponsored them to other collaborators, expanding the startup's network of potential clients.

Discussion

Scholars agree about the debate that innovative startups formation is strongly influenced by the actors engaged in the territory, creating an entrepreneurial ecosystem (Spigel, 2017). However literature addressing how innovative startups engage with SMEs to grow and scale is evidently unexplored.

For this reason the aim of this research is to dig into this kind of relationship in order to open the opportunities for further new directions. In the theoretical part of the work we analyzed how open innovation is moving toward a more collaborative approach and how beneficial connections among SMEs can be inside EEs.

In particular, an empirical analysis on a peculiar kind of EE has been conducted, the Italian Industrial Districts (IIDs). This analysis points out the complexity and heterogeneity of the Italian entrepreneurial environment, showing relevant presence of innovative startups inside or close to IIDs, confirming the Marshall-Arrow-Romer (MAR) assumption that SMEs concentration and specialization influences new entrepreneurial activities. On the other hand, also Jacobs assertion that urban contexts are the focal points for creation of new innovative firms is partially confirmed.

Moreover, we discovered that the influence of IIDs is not constrained just to their borders, but also neighbor areas are affected by their presence. Therefore, IIDs constitute a crucial role in the Italian entrepreneurial ecosystem for what concern the creation of innovative startups.

The second part of the analysis focused on the thematic of industry relatedness. The two methods adopted do not provide strong evidence of connection between IIDs and startups industries. Even though the results are not promising for deducting correlation between industry relatedness and number of startups inside IIDs, we should not interpret this information as a negative factors. In fact, notwithstanding the importance of cognitive proximity, a new wave of digital entrepreneurship can generate greatly positive outcome in locations as IIDs that are intensely characterized by a manufacturing and traditional heritage, without destroying the culture and social mechanisms distinguishing IIDs so far.

From the perspective of the traditional SMEs, high startup presence in the territory represents a big opportunity to cooperate and introduce high technological and knowledge

intensive solutions, in industries which are inherently low tech. For this reason, the thesis also proposes successful case of collaboration between an innovative startup and a SME inside the Paduan district.

Extant literature about collaboration has focused on how large and very large firms are engaged with small and medium-sized enterprises, especially with startups to increase their innovation capabilities. This kind of partnership is strongly asymmetric and, consequently, the two organizations incur in a multiplicity of obstacles, leading very often the collaboration to nowhere. This work tried to make this asymmetry smaller, by substituting the large corporation with a medium enterprise.

Different phases can be defined to understand the structure of the collaboration: partner selection, agreement definition, solution development and implementation, conclusion of the project. For all these phases the work tries to extrapolate insights on the collaborative procedures, determinant for the collaboration success. First of all, the selection of the partner is a crucial phase, and the wise selection of the collaborator can be facilitated if some connection and past acquaintance between actors are there. Once the agreement has been settled, the startup adopted the most suited software development procedure through an Agile combined with Kanban approach. In this phase has been fundamental the high level of independency of the startup, which allowed them to bring out the best without undermining their potential with strict requirements. The other component increasing effectiveness in the relationship is a continuous dialogue, also favored by geo-proximity and a high empathy level created during the whole collaboration. This factor has been very important also when collaboration reached the end, in fact connections going a bit beyond the business relationship enables periodical interactions for discussing about future potential innovation projects, or even simpler informal sponsorship and requests for advices.

Here below, the insights that the collaboration provides about the success factors favoring a positive collaboration outcome are shown.

Bedeschi key factors enabling the collaboration to succeed are:

- Low level of rigidity, favoring easier communication and decision making;

- CEO fostering a culture of promptness to welcome and consider anything is innovative;
- To preserve the IT manager as unique pivotal role for fast alignment and problem reports;
- To avoid abusing of dimension power and exploiting their unbalanced position against Airlapp.

Airlapp key factors favoring collaboration outcome are instead:

- Brilliant attitude and willingness to do and overcome expectation;
- Deep understanding of partners necessities, also for what regards not explicated components;
- Great competence in the software development field decreasing the complexity given by a lack of strict requirements;
- Capability to develop the solution independently, with just some input information.

Conclusion

The thesis set the stage for advancing the understanding of the role that SMEs have in the Italian EE. The empirical analysis provides descriptive evidence about the relation that SMEs have with innovative startups inside IIDs, where SMEs tend to agglomerate. We have discovered that there is relevance about innovative startup presence inside and closed to Industrial Districts, this implicitly shows that SMEs located in these areas influence new venture formation and growth. The analysis on industry relatedness, instead, does not show explicit connection with entrepreneurial initiatives.

The successful study case proposed, reveals the great opportunities that a relationship between a traditional SME and an innovative startup can provide. We have proposed interesting insights about the reason why SMEs should seek a startup as partner and what positive impact such a collaboration can generate for both the organizations. Eventually the thesis deduces the key factors enabling the collaboration to work.

The study is not free of limitations. The empirical analysis' outcome is strongly influenced from the ATECO classification of economic activities, which is not always able to reflect the real activities performed by companies. The other limit is related to the low capability to generalize the insights deriving from a single case. In fact, the motivation behind the success could not be replicated in other contexts in which startups and SMEs collaborate. Eventually in the chapter are listed possible future directions for the research.

CHAPTER 1: INTRODUCTION

The concept of entrepreneurial ecosystem (hereafter: EE) emphasizes that entrepreneurship takes place inside a dynamic and evolving community of individuals, organizations and governmental actors rooted in a territory (Freeman and Audia, 2006; Isenberg, 2010). It is important to mention that modeling such a complex system of interactions between agents is really arduous. Furthermore, we decided to start analyzing the smallest part of these complex ecosystems to better understand which context-specific relationships are activated (Sterman, 2000).

Following these lines of reasoning, we decided to increase the understanding on how new ventures are created and are able to grow in EEs. To date, studies addressing this topic focused their attention on the links that new ventures and startups create with incubators, venture capitalists (VCs), universities and large corporations. Venture capitalists are fundamental for increase new venture's possibility to access financial resources during the early stages of its lifecycle (Gompers and Lerner, 2001), incubating initiatives allow to create a positive environment around new ventures fostering their growth and scaling potential (Cavallo et al., 2018) and universities are able to provide specialized knowledge in applied or basic science and engineering (Bonaccorsi et al., 2013).

Finally, several studies highlighted the leading role of large corporations engaging with and supporting new ventures in EEs (Bhawe and Zahra, 2017). In fact, especially during a period in which the pace of technological innovation is very fast and it is difficult to detect opportunities in their initial phase alone, large companies use to select and collaborate with new ventures and, in particular way, with startups to decrease the risk of failure in gaining these advantages (Rothwell and Dodgson, 1991). On the other hand, small and early-stage firms are typically resource constrained and struggle to access assets they need to survive and compete in the market (Oughton et al., 2013).

Despite the increasing interest in the issue about firms' collaboration inside EEs, the largest part of studies have been focused on large and multinational technological companies

(Sungjoo Lee et al, 2010). Conversely, the relation linking new ventures to small and medium-sized enterprises (SMEs) have gone under-remarked, that is an important gap in the literature on EEs.

1.1 Collaboration with startups

As we already mentioned, a special kind of relation involving firms in EEs is the collaboration with startups, where "A startup is not a smaller version of a large company. A startup is temporary organization in search of a scalable, repeatable, profitable business model" (Steven Blank[1], 2010), or under Ries's (2011) definition: "A startup is a human institution designed to create a new product or service under condition of extreme uncertainty". Indeed, startups are an attractive source of new ideas generation, but typically are resource-constrained and not able to reach the final market and to commercialize their inventions. On the other hand, large companies seek for valuable ideas as input to their processes.

The reason why small and medium-sized enterprises (SMEs) have been excluded from the mainstream, is that cases of relationships are easier to be studied in large firms, as they have greater managerial and financial capabilities to access external resources and engage with other companies (Narula, 2004); although it is generally recognized that SMEs abundantly use non-internal resources (mainly from other SMEs), through informal alliances and collaboration networks that are essential for their survival and to sustain innovation.

Moreover, the process of forming the linkages necessary for an asymmetric collaboration between small and large companies is a struggling path, due to their different internal structure and processes. From the small enterprise perspective, the exploitation of the benefits emerging from the collaboration are not always ensured, since they can be fully absorbed by the large corporation, due to their bargaining power. For this reason, typically SMEs prefer to create connection the one with each other, rather than with large companies (Rothwell and Dodgson, 1991). They act in a collaborative way because they lack resources

[1] https://steveblank.com/2010/01/25/whats-a-startup-first-principles/

and cannot support incremental innovation by themselves. Anyway, little is said about these connections overtime (Edwards et al., 2005) and, in particular, cases of relationship addressing startups and SMEs are very scarce, despite they contribute considerably to employment in all countries.

Typically, startups have developed high technological competences in-house, what they miss is the capability to manufacture and distribute their solution and transform the technology into a profitable business (Vanhaverbeke et al, 2012). On the other hand, SMEs in low-tech industries have proven to be successful in time, however nowadays globalization and digitalization result in new challenges for their competitive landscape; startups open them opportunities for integrating knowledge and the creation of new products or services. Therefore it is necessary to deepen into this thematic, by understanding which processes and managerial procedures are applied in order to achieve successful collaboration, able to bring benefits on both sides.

1.2 Thesis Accomplishments

This work tries to fill the gap of knowledge on collaboration between SMEs, by investigating on the Italian context, initially through a geographical and industry proximity analysis on innovative startups and SMEs, with the aim to gain insights about agglomeration economies and new venture creation. The second part of the thesis concentrate on studying a single Italian successful case of collaboration between a SME born during the first wave of entrepreneurship and an innovative hi-tech startup. The aim is to uncover which informal processes have been conducted by both the companies to make the collaboration work properly, which key professional figures emerged to reach the goal, which kind of benefit the collaboration brought for the two realities and the main difficulties encountered.

The case has been developed through a qualitative research, based on two interviews: one to the CEO of the digital startup and the other to the IT manager of the SME. The choice of the instance has been made consistently with the empirical work on agglomeration of firms conduced in *Chapter 4*, indeed both the companies are sited in the Paduan industrial

district, that also prove how much it is relevant geographical positioning and potential connection with neighbour companies.

This thesis will provide the following contributions. First of all, the empirical analysis brings evidences about a positive correlation between high concentration of SMEs operating in traditional industries and new venture creation. Secondly, from the case study, it emerged that SMEs and startups can gain very valuable benefits from the collaboration, permitting the SME to renovate its business model and the innovative startup to grow and scale depending on the phase in which they are in the lifecycle. A high level of startup commitment is fundamental for a successful relationship and mutual trust is the key to preserve startup independency that is the enabler to overcome SME's initial expectation. Eventually, success in this type of collaboration resides in the SME's capability to set aside rigidities in procedures and embrace an agile approach, aligned with the startup philosophy. To this aim some roles inside the organization need to emerge to drive the whole firm to toward an entrepreneurial attitude.

CHAPTER 2: OBJECTIVES AND METHODOLOGIES

The scope of this chapter is to illustrate the objectives and the main topics that the thesis proposes, and therefore the methods adopted to achieve them.

It's important to mention that the work has been developed in collaboration with the Startup Hi-Tech Observatory of School of Management of Politecnico di Milano; this support contributed to the analysis of context on the Italian entrepreneurial ecosystem and to the further improvements of the results and insights.

2.1 Research objectives

To provide a clearer overview of what are the thesis contents, the work has been here divided into two macro sections, each of them characterized by a research question and some statements to better identify the analysis performed:

- Where is new venture creation fostered in Italy?
    - Description of how startups are distributed inside the Italian territory, with a particular focus on Italian Industrial Districts (IIDs);
    - Analysis of the drivers fostering new venture creation and proximity relatedness between startups and firms.
- How could collaboration between SMEs and innovative startups increase growth and innovation?
    - Description of the importance of collaboration for SMEs renewal and startup scaling;
    - Analysis of a successful collaboration case between a medium-sized enterprise and an innovative startup.

2.2 Methodologies

The activities performed to conduct the analysis of this work can be subdivided into:

- Literature Review
- Analysis through secondary sources
- Two interviews

2.2.1 Literature review

The literature review has been the starting point of the thesis, but it has been also carried on during all the other phases. It has been fundamental to deeply understand topics about entrepreneurial ecosystem, agglomeration and proximity economies and collaboration between companies. The analysis has been performed by research of scientific papers based on:

- Sources: the most used tools have been the platforms Google Scholar[2], Scopus[3], ResearchGate[4] and other website for scientific research.
- Keywords: regarding the discussed topics (as "Collaboration" and "SMEs", "startup collaboration", "Agglomeration dynamics", "Italian districts").
- Relevance: screening phase has been performed for the selection of the most coherent scientific articles, depending on the themes discussed, year of publication and importance of the papers.

All the articles have been stored and classified depending on the arguments discussed, resulting on a totality of 45 papers. The analysis allowed the creation of scientific knowledge that constituted a solid base for the discussion and the insights developed by the thesis.

[2] https://scholar.google.com/
[3] https://www.scopus.com/
[4] https://www.researchgate.net/

2.2.2 Analysis through secondary sources

Secondary sources have been used mainly to gather data about innovative startups and the classification of the Italian territory by Labor Market Areas and Districts; they have been the basis from which the empirical analysis started. The databases used are further shown in *Chapter 4*. The largest part of data has been accessed from ISTAT[5] and Italian Chamber of Commerce website[6]. Moreover, few other external sources have been used to gain other information as Eurostat[7], the websites of the two companies analysed in the collaboration case and business news sources.

2.2.3 Interviews

The two interviews conducted are the core contribution for what regards the second part of the thesis, concerning how innovative startups and SMEs can collaborate in order to innovate and grow. Our study proposes an interview to the IT manager of the middle enterprise Bedeschi and another to the Co-Founder and CEO of Airlapp, the innovative startup. The aim of this qualitative analysis was to emerge which key factors and managerial procedures the two organizations adopted to make the collaboration work properly.

[5] https://www.istat.it/
[6] http://startup.registroimprese.it/isin/home
[7] https://ec.europa.eu/eurostat

CHAPTER 3: SMES AND INNOVATIVE STARTUPS IN EE

3.1 Entrepreneurial Ecosystems

Entrepreneurship is highly affected by factors that are extrinsic to firms' direct control, this systemic view of entrepreneurship assumes that other players impact on the birth and growth of a new venture. This totality of actors operating in a specific territory and all the linkages that are developed between them is called entrepreneurial ecosystem (EE). Entrepreneurial ecosystems are a combination of social, political and cultural factors that are engaged together to create a fertile ground for startups creation and growth within a region (Spigel, 2017).

An initial definition of this set of interactions has been originally referred to the biological system, encompassing its physical environment, and all the interactions possible in the complex of living and nonliving components (Tansley, 1935). Then, moving to the entrepreneurship field, entrepreneurial ecosystem has been defined as a: "set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory". (Stam, 2015)

This definition is acknowledged for its comprehensive nature because it embodies all the relevant elements of the entrepreneurial ecosystem, which are:

- The interaction between lot of actors and components interdependent each other as its dimension of dynamic complexity;
- The creation of new ventures, that is the aim of the EEs;
- Focus on a productive type of entrepreneurship, that is innovative and growth-oriented, since considered the most responsible for social welfare and economic growth by leading political institutions;
- Focus on territory-specific dimension.

For what concerns the last point of the aforementioned definition, regarding territory-specific dimension, nowadays digital technologies arise the possibility for companies to

source capitals, goods, information and technologies from around the world, thanks to faster transportation and communication means. Theoretically, more open global markets should diminish the role of location in competition. But in the end, in the moment in which a resource is available and reachable by any company at any moment, it loses its competitive advantage, because potentially all the firms can benefit from its value (Porter, 1998). For this reason, there is still the need to concentrate into territory-specific dimension and exploit all the relations and mechanisms that are triggered inside an entrepreneurial ecosystem, if a company wants to achieve strong competitive advantages.

Many studies highlighted that the main players participating to the EE are entrepreneurial actors (startups and potential new firms); organizations and firms well consolidated; venture capitalists, business angels, banks; institutions as universities and public sector bodies (Mason and Brown, 2014). All these organizations influence directly or indirectly the development of a positive climate fostering new ventures creation.

The government itself is one of the fundamental actors, if not the most importing. However there are several elements fostering entrepreneurship that must be taken into account, such as culture, capital market, leadership. Yet, it is impossible to imagine that alone government interventions can generate high impact on the entrepreneurial environment. Following this reasoning, for-profit companies must be included into consideration and incentivized to provide their efforts, since they have the capability to sustain an economically sustainable growth (Isenberg, 2010). This "privatization" of entrepreneurship (Stam, 2015) implicates a more complex environment composed by many players, but can be circumscribed to a combination of six forces interconnected (Isenberg, 2011)[8]:

- Culture: to raise awareness about entrepreneurial opportunities;
- Market: having a market prone to welcome new products or services really matters for testing and developing novelties;
- Policy and leadership: government may provide regulation to incentivize and ease entrepreneurs;

[8] https://www.forbes.com/sites/danisenberg/2011/05/25/introducing-the-entrepreneurship-ecosystem-four-defining-characteristics/

- Finance: availability of actors willing to wager on startups is a great enabler for increasing the chance to succeed in entrepreneurial contexts;
- Support: incubators, consulting companies, legal consultant can provide complementary and specialized knowledge to startups;
- Human capital: eventually, companies are compounded by people before technologies, in a context of limited resources and high risk, people are required to be more inventive and cross-border.

Venture capitalists are fundamental roles to satisfy the financial needs and managerial support in the early stages of a venture life (Gompers and Lerner, 2001), and for this reason of paramount importance. Incubating initiatives have also a positive contribution fostering creation of innovative startups, by permitting to open new opportunities of networking (Cavallo et al., 2018), while universities are able to provide specialized knowledge in applied or basic science and engineering (Bonaccorsi et al., 2013).

Finally, interactions and support between companies can be incredibly profitable in terms of growth and innovation, and it is solid the statement that large companies have a great incidence on new venture creation, thanks to their open innovation and collaboration activities. The same consideration cannot be made for SMEs, since this field of research is nowadays almost underexplored. Although, in many EEs where the VC market is underdeveloped and there are few large corporations, there is a great presence of SMEs - often operating in traditional industries - which are deeply rooted in the territory and should be considered when dealing with new venture creation issues.

3.1.1 The Italian entrepreneurial context

This work has been developed in collaboration with the Startup Hi-Tech Observatory of School of Management of Politecnico di Milano. The research conducted by the Observatory contributed to advance an analysis of context of the Italian entrepreneurial ecosystem ("*Innovazione Digitale 2020: Imprese e startup insieme verso l'open company"*. Osservatori Digital innovation – Politecnico di Milano, 2019). In particular, the analysis focused on Equity investments in Italian hi-tech startups from:

- Formal actors: investment funds that select their target based on structured and rigorous process (e.g. funds of Independent Venture Capital (VC), Corporate Venture Capital (CVC), Governmental Venture Capital (GVC), Regional Financial institutions);
- Informal actors: organizations, individuals and groups of individuals which base their selection on a less structured process, typically finding the target first and just in a second moment seek for capital to be invested (e.g. Venture Incubators, Family Offices, Club Deals, Angel Networks, Independent Business Angels, Equity Crowdfunding platforms, organizations without a structured fund of CVC);
- International actors: investments coming from investors localized in foreign countries (both formal and informal).

For 2019, the research estimates a total investment in Equity in hi-tech startups amounting to 694 million Euro, with a growth of 17% with the respective to 2018. This growth constitutes for many a slowdown for the growth toward the billion Euro, very ambitious objective considering the long period of stagnation and scarcity of economic resources characterizing the Italian current economy. This small growth can be attributable to the lack of deployment of 1 billion Euro announced by Fondo Nazionale Innovazione during 2018 that compromised capital availability and generated reluctant behaviour of many funds. On the other hand, the future promises very positive National and European initiatives aimed at the constitution of new funds for supporting the Italian ecosystem toward a needed growth. However, by comparing the Italian ecosystem with international benchmarks as France, Germany and Spain, it results a large distance with these realities; and while the billion Euro for Italy represents an objective not already reached, for these countries it constitutes a minimum requirement.

For what regard the level of financing from informal actors, it has been invested 248 million Euro resulting into a very interesting growth (+32% compared to 2018). This because informal investors have a crucial role during the early stages of the startup lifecycle, permitting them to have available resources in their initial phases and to arrive in front of formal investors in a more structured and solid form. On the other hand, VCs and formal investors more in general are essential to provide the possibility to the startups of being

more prepared when they have to accomplish the scaling phase and to compete at international level. While referring to corporates, many investments are still made in a non-structured form, acting prevalently as informal investors rather than through Corporate Venture Capital funds. In this perspective, it is becoming always more important to create internally to companies an entrepreneurial management and culture fostering strategic initiatives of collaboration with startups. The last component of international investments confirms its relevance for the Italian landscape, representing the 33% of the total invested in startups.

Although investments in Italian hi-tech startups are still smaller compared to other European countries, government and institutions are taking initiatives aimed to favour collaboration between incumbents and startups. In fact, during 2019 some relevant actions have been undertaken, as the recognition of the role of Innovation Manager through a dedicated register; of the Voucher for innovation consulting, permitting small and medium-sized enterprises to access digital solutions; Funds of Funds, with the objective to invest into VC funds or directly into startups; Global Startup Program and other programs.

3.2 Agglomeration economies

An important typology of EE in the Italian landscape can be represented by the model of the Italian Industrial Districts (IIDs). This concept has been originated from Marshall theory on *agglomeration* in 1890; he identified that companies used to locate close to each other, because proximity facilitates knowledge transfer intra-industry, decreases raw material and components transportation costs, and enables firms to benefit from a more competitive and specialized labor market. Moreover, agglomeration can trigger the generation of the so-called *cognitive proximity*; an effect that is created when people and organizations are able to exploit a shared knowledge and expertise to improve their current business processes through a mutual exchange of information and practices (Boschma, 2005). The Marshall-Arrow-Romer (MAR) model assumes that knowledge cannot be transferred across different industries and highlights that agglomeration by *specialization* decrease transport cost and allow high productivity and efficiency thanks to labor market pooling.

The agglomeration economies based on localization and specialization, collided in literature with the agglomeration based on *diversification*; also called urbanization economies, since large variety of firms can be observed in urban context. Jacobs (1969) affirmed that diversified ecosystem of relationships is the major driving force fostering innovation and growth, since heterogeneity allows businesses to imitate, share ideas across industries and reshape with complementary goods or services. This viewpoint is reinforced if a well-functioning infrastructure for transportation and communication is in place, favoring knowledge exchange and therefore innovation and growth (Beaudry and Schiffauerova, 2009). Moreover the combination of diverse products and knowledge can lead toward the development of innovation or improvements of production, while a too high degree of industry relatedness between firms could threaten their innovation performances (Sapienza et al., 2004).

Controversies emerged between the two models when researchers tried to find correlation between their existence and new venture creation. Anyway, both the models have been taken into account under the *Knowledge Spillover Theory*; key source for entrepreneurship and startup formation (Acs et al., 2009).

Referring to this theory, there are many agents in the economic system that can take advantage from investments in R&D: the firm that directly invests in the research, incumbents, new entrants. Knowledge spillover takes place when firms investing in the research activity do not fully appropriate the value of the research, because have not understood the potentiality or don't have enough incentives to commercialize it. Therefore, the new ideas generated from these investments, could leak outside the companies and be absorbed by new or already existing firms.

More specifically, if knowledge is generated through a deliberate decision to reach a given outcome and this outcome is realized exactly as intended, knowledge spillover does not happen. Differently, if the company creating knowledge has not the entrepreneurial capabilities to commercialize it, the knowledge can stay in a latent form (Caiazza et al., 2019). Subsequently, if recognized by an entrepreneur external from the original company, this can lead to a form of emergent entrepreneurship not expected when knowledge was

realized. Therefore, a latent form of entrepreneurship exists until someone will be able to gather this knowledge that spills out and innovation is introduced by another actor.

Evidences show that this assimilation process is favored when firms are nearly localized and a latent form of entrepreneurship can be carried out. It has not already been clearly proved which externality among, specialization and diversification, creates the most favorable environment for innovation and economic development and the debate between scholars is still open. Not necessarily agglomeration implicate an efficient entrepreneurial ecosystem fostering innovation, but the outcome can vary among different cases. Many times, firms in clusters just benefit of being located in proximity and of the possibility to cooperate and learn techniques from each other, but these alone are not sufficient to entail new ventures creation and economic growth. To foster this entrepreneurial outcomes other drivers must be there, as entrepreneurs, open minded workers, investors, and mentors; favorable government policies; research universities and other sources of innovative knowledge; availability of local customers; and an entrepreneurial culture that encourages risk taking. (Spigel, 2017).

Thus, in this thesis Italian Industrial Districts (IIDs) are examined as a third form of agglomeration dynamic that can potentially foster entrepreneurship. In this peculiar cluster, internal processes that are created are similar to the Marshallian concept of agglomeration, but what distinguishes IIDs is the strong characterization of different actors, all participating to the production chain, and not simply belonging to the same industry as for Marshallian clusters.

Our research concentrated the attention on the Italian landscape, to understand if localization mechanisms influence the innovatory characteristics of specific territories.

3.2.1 Italian Industrial District definition

Basing on aggregation theories, scholars agree in the identification of two main streams of thoughts. The view denoted as the Marshall-Arrow-Romer (MAR) externalities, suggests that high concentration of firms specialized in a given industry facilitates knowledge spillover across firms (Audretsch, 1998). This means that proximity and localization in a circumscribed area of firms specialized in the same sector, enables the development of

entrepreneurial opportunities; endogenously conceived and purposefully sought within firms (Marshall, 1890). The knowledge spillover theory implies that entrepreneurial activities are greater in environments in which investments in research and development are high, where new ventures have been able to exploit firms' difficulty to convert knowledge into market solutions. The larger the expenditures in wisdom development, the more impactful is the spillover effect toward entrepreneurs. On the other hand, if incumbents are able to fully absorb the knowledge generated, no knowledge spillover stands (Acs et al., 2009).

The other largely affirmed view is the Jacobs (1969) perspective, who sustained that the most important source of knowledge spillover is based on the diversity of firms that create linkages the one to the each other, creating new synergies and values across industries.

This study analyzed in depth a precise typology of entrepreneurial ecosystems, that are Italian Industrial Districts (IIDs). They can be assimilated to the Marshallian definition of clusters; the difference stands in the peculiarity of IIDs to gather in near places companies that do not necessarily belong to the same industry, but they can be also characterized by a supplier/customer connection and for this reason they can be both horizontally and vertically related along the supply chain.

Becattini, who spent a large part of his researches dedicating to the districts' evolution, defined the district local areas as "an agglomeration of many small enterprises inside narrowed areas, each of them specialized in a production phase, but at the same time infused with the others in a way that allows to constitute the manufacturing local chain" (Becattini, 1991).

Typically these firms are manufacturing SMEs, originated during the "first wave" of entrepreneurship. Industrial districts have the peculiarity to develop common social and cultural values among all the firms operating in it, and socio-economics mechanisms able to create a climate encouraging innovative initiatives. Moreover, the linkages connecting firms inside IIDs permit them to overcome the usual way to do business, operating with a mix of competition and cooperation that raises the average level of competitiveness (Belussi and Sedita, 2009). These externalities can allow to speedup innovation, even in traditional industries (Cavallo et al., 2018).

In time IIDs have been subjected to a lot of transformations and changes, but still toda,y they represent a great component for the Italian economy. For this reason we decided to take them as a privileged context to obtain empirical evidence on startups and SMEs relation.

3.2.2 IIDs History

The birth of Italian Industrial Districts dates back to the 1950s, when, concurrently with an increase of employment, either already existing or newborn, small and medium sized enterprises arose localizing themselves in very narrow areas. The forces at the base of the origin of these industrial areas were specialized craftsmen presence, natural endowments (as forests, rivers or rich presence of materials for production and tools manufacturing), high level of internal dynamism between actors or the entrance of an external dynamic multinational firm that operated as the center of gravity for the entire local system (Belussi, 2015). The main manufacturing sector of IIDs were all related to the *Made in Italy*, and particularly, the most relevant activities were textile, clothing, ceramic, goldsmithing and shoes.

By the end of 1980s, IIDs reach a phase of maturity almost all over the country. During this evolution, diversification and differentiation strategies were important mechanisms for enlarging local capabilities and pave the way for new development trajectories (Belussi and Sedita, 2009). Since 1990s, the globalization trend and internet diffusion represent a big threat for IIDs which make of their main advantage localization and agglomeration economies. Indeed faster communication through the internet all over the world, reduction of transportation costs and international presence of corporates can offset the advantages of proximity and efficiency that have characterized these areas so far. Companies coming from eastern countries as China and India, proposing low-cost manufacturing products became new rivals for SMEs inside clusters, implicating potential economic crisis for local artisans and small manufacturing firms.

The reaction of the enterprises inside the district local systems can be divided into two dominant strategies (Ferrucci and Picciotti, 2017). The first one has been to adopt an offshoring strategy. Indeed, for a very long time, the IIDs have considerably contributed to Italian export, so it is not new to them to undertake an internationalization strategy. To

offset the risk brought by foreign multinational companies, district enterprises decided to externalize marginal and low value-adding activities in countries were labor cost is inferior compared to the Italian one. Once again, they tried to agglomerate also abroad to recreate the typical district atmosphere. The second strategy adopted has been the opposite, that means, instead of mobilizing outside Italian borders, companies aimed to attract low-cost labor force from middle-east European countries. In time, with the advent of 2000s, the opening and the settlement in new markets as the Chinese one, opened new strategic opportunities. This because cost and efficiency strategies followed price wars, that were no longer viable due to the limited scale of the local enterprises with the respective of the global companies. For this reason the new emerging strategy has been customer-driven, by relying again on *Made in Italy* and increasing quality toward luxury products, satisfying well-off portion of the markets.

For what regards technological advancement, SMEs in such local systems have been initially reluctant from the use of innovative and digital solutions; they were specialized in processes requiring a low level of technology, so their propensity toward the use of Information and Communication Technology (ICT) advanced at a slow pace (Belussi, 2005). During these years, however, firms in IIDs seemed more inclined in the ICT adoption in the moment in which the objective became to better respond to final customer needs, rather than improve communication between actors along the supply chain (as EDI or ERP applications). This has not to be interpreted as a negative factor, as a matter of fact it is a demonstration of the great quality of informal communication inside these local systems that cannot be transferred into a digitalized format.

Nowadays, it is possible to conceive how fragmented and variegated the Industrial Districts become. Globalization and digitalization provoked changes in the local strategy of firms belonging to these markets, and also a trend of back-reshoring toward Italy is verifying; due to high complexity of maintaining an international strategy, a general increase of labor cost also in developing countries, too uncertainty and volatility of foreign emergent markets. Also banks and investors are more inclined to grant money to companies having their supply chain located inside the origin country. All these reasons are creating high uncertainty around the future of IIDs, from internationalization to reshoring strategies (Ferrucci and Picciotti, 2017).

3.3 SMEs and Startups definitions

The perspective of analysis that has been taken in order to study IIDs in Italy, relates to SMEs and innovative startups inside entrepreneurial ecosystems. First of all, we will try to examine the definition and characteristics of these two kinds of firm, then what makes the one really differ from the other category, because many times scholars tend to join them together, without making distinctions.

Small and medium-sized enterprises are the backbone of Europe's economy. They represent 99% of all businesses in the EU[9]. In the past five years, they have created around 85% of new jobs and provided two-thirds of the total private sector employment in the EU. Defining a small and medium-sized enterprise is really important, since to belong to this category permit to access finance and EU support programs specifically targeted.

European legislation recognizes Small and Medium-Sized Enterprises in the EU recommendation 2003/361. Medium-sized category includes all the companies having less than 250 employees and either with a turnover of less than 50 million € or with a total asset registered in the balance sheet lower than 42 million €. To be part of small and micro enterprises category, these limits becomes stricter.

Actually, by considering this definition, also innovative startups can be part of the SMEs totality. Indeed, it is possible to consider innovative startups as a special sub-group of SMEs.

Italian government, perceiving the central role that entrepreneurship and innovation have in a sustainable economic growth, defined a special section in the company register through the Decree Law 221/2012 ('Italian Start-up Act'), and policies have been defined to provide a special support to the registered firms. Companies can advance a proposal to be registered as innovative startup, if they comply with the requirements listed in *Chapter 4*.

This is the way how innovative startups and SMEs are recognized by policy makers in Italy. However, as aforementioned, startups are not always clearly distinguished from SMEs, but they are considered jointly with them or as a subset. Indeed, there are a lot of characteristics

[9] https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en

shared between these two kinds of organizations, as the informality of the adopted practices and of how people use to relate to each other, which let them to be strongly flexible by nature. But on the other hand, there are many elements that clearly differentiate them and if excluded from the research could induce into errors.

The first relevant aspect characterizing startups and small and medium-sized enterprises is their inception. In particular, the largest part of small and medium sized enterprises is born in an era of entrepreneurship started with the Taylorism and subsequently with the Lean philosophy. From this first wave of entrepreneurship emerged a variegated range of enterprises, differentiating for size and pace of growth, but commonly sharing the peculiarity to belong mainly to the manufacturing sector and to be specialized in low and medium technological intensity activities. Eventually, this large set of organizations can be simplified by distinguishing the ones that have been able to expand their boundaries and become large corporations, from the ones which scope remained limited to local markets, that are small and medium sized enterprises. Instead, innovative startups originate from the fourth industrial revolution, thanks to the advent of the Internet and typically build their value proposition on hi-tech solutions. This wave of entrepreneurship has been defined by Stam (2015) as "productive entrepreneurship", that is that kind of innovation able to produce new and positive outcome for the economy. It encourages also ventures to take the risk of failure, in the moment in which the impact of their efforts could inspire and activate new impulses for entrepreneurship.

The second characteristic that is used to differentiate SMEs from innovative startups is the scope they aim to reach and their attitude to growth. While SMEs are strongly rooted into the territory and culture, are typically not dominant in the market and sceptical about innovation opportunities (Carland,1984); startups are innovation driven enterprises and for this reason they are inherently expected to grow fast and internationally until the exit advent.

SMEs have a higher rate of linkages in their network of relationships compared to larger firms. However, the majority of these connections are mere informal relationship of procurement, more than alliances or co-development practices. Indeed, they tend to focus just on core activities; the other are outsourced but avoiding tight collaborations since they

require higher risk in term of relational specific investments, costs for managing the relation and capability creation (Narula, 2004). For this reason, they are more carefully engaged in formal collaboration practices and attentive in the partner choice, because of their limited opportunities to fail.

According to a survey conducted by the observatories of Startup Intelligence and Digital Transformation Academy of Politecnico di Milano on a sample of 525 Chief Executive Officers and C-levels, Italian SMEs are poorly involved in open innovation processes, affirming that just 28% of organizations invest in these kind of initiatives, with a 85% of respondents that are not interested in starting a collaboration with startups[10].

3.4 Collaboration between SMEs and Startups

By taking into account the final considerations of Section 3.3, it is reasonable to conceive that SMEs should not be contemplated as a proactive actor in an entrepreneurial ecosystem. Many times indeed, the level of collaborations between SMEs and startups is sub-optimal. This due to the fact that, although startups are continuously in search of ways to reach the market through their innovations, practices needed by SMEs to develop innovation constitute an effort too big. Moreover, they are more attentive to optimize their current business and process efficiencies and do not attribute the right weight to the importance of renovating their own business model.

Notwithstanding this argument, this work tries to show that startups and SMEs can successfully cooperate if the right conditions are in place. This since, innovative startups and SMEs possess very often complementary needs and resources that if exploited together can bring great benefits to both the organizations.

3.4.1 Drivers for collaboration

Small and medium-sized firms are typically focused on excelling in just few main activities. For this reason, they tend to access information, expertise and technologies from external

[10] https://www.economyup.it/innovazione/innovazione-digitale-2020-in-italia-ancora-troppo-divario-tra-grandi-aziende-e-pmi/

sources in that fields in which are not directly competent or new to them (Rothwell and Dodgson, 1991).

Also startups, for a lack of resources, are always seeking for external partners that can let them facilitate products and ideas development and access to commerce markets (Usman and Vanhaverbeke, 2016). On the same time, they are also likely to avoid collaboration with large firms, as they could limit their potential capability and independence. In too many cases, indeed, goals and business process differences with large firms cause collaboration to end up nowhere. Furthermore, they typically prefer to connect themselves with other SMEs or institutions as research centres and universities to gain greater benefits and synergies (Rothwell and Dodgson, 1991). SMEs are encouraged to connect with other SMEs because of diverse motives (Franco, 2003). The first one is related to innovation and organizational learning, that means they cannot remain competitive and continue to innovate alone for a lack of resources (Welbourne and Pardo-del-Val, 2009). The second factor can be identified in the willingness to gain market power and facilitate international expansion, and in this case a collaboration with foreign SMEs already established in the target market could be necessary. For manufacturing companies, collaboration can be triggered for risk sharing motives and to reinforce production capacity. The last reason why SMEs cooperate, in particular when dealing with startups, is resource dependence. In fact, startups are always in need of tangible resources that alone are not able to access, while by cooperating with a bigger enterprise these needs could be reduced or even eliminated thanks to investments from the counterpart.

Once mentioned the reason why startups and SMEs are encouraged to collaborate, we will try to understand which complementarities and similarities are enablers to make the collaboration work. First of all, as mentioned above, the two typologies of firm have different goals. The innovative startup strives to reach a global scale (Stam, 2015), differently from many SMEs that focus to reinforce their current presence mainly in niche and local markets. The second main difference is connected to their propensity toward innovation. SMEs have a more local characterization and operate in traditional industries, typically sceptical about novelties; innovative startups are instead innovation driven and have the inherent ambition to scale fast and grow internationally. These diversities suggest that the result from the partnership can be beneficial to both the scopes, without threaten

the counterpart stability. Then, some similarities can allow SMEs and startups to easily talk to each other and to drive the collaboration to its best performance. Despite a more structured organization, SMEs remain intrinsically flexible in their internal and external processes and linkages (Hudson et al, 2001). This characteristic is compatible with the high openness and agility of the innovative startup, while representing a criticality when trying to establish a harmony with strongly rigid and formal corporates. Eventually, SMEs place more value on relational capital than large firms do; not considering human capital per se, but the relationship that humans have as the most valuable and inimitable resource (Welbourne and Pardo-del-Val, 2009).

The choice to engage with a partner and the subsequent decisions on how to proceed among SMEs are typically taken basing on intuition of deciders, mutual cohesion and the sense of "right chemistry" between partners. Again, traditional large companies usually have a more structured process of selection and act with completely rational processes. For this reason, many times choosing a startup as a partner has embedded a too high risk and so, difficultly would choose as a partner a startup without history and experience. Instead, entrepreneurs can be easily inclined to put in place a more personal approach when taking decisions on the partner choice.

These aspects show the potentiality to create the right climate for cooperation between startups and SMEs. What already misses, is the fuse that could allow the collaboration to be initialized. Many times, this activating factor is external and consisting on a customer need that the firm alone is not able to satisfy (Mercandetti et al., 2017). In fact, while collaborative approach represents an integral component during the phases of growth and consolidation of a startup lifecycle, SMEs usually look for a partner just in the moment in which a customer specific request pushes the firm beyond its boundaries, seeking for external competences able to fulfill their deficiencies.

The results from the efforts of the two organizations joined together can be very valuable, satisfying needs and increasing strengths of both the realities. Innovative startups develop their value proposition in high technology fields, but typically they don't have competences and knowledge about how to exploit and implement such innovation. Traditional SMEs can fill this gap, because they are deeply specialized in their core activities and expert of the

traditional sector they belong to, and can help the new venture to find application fields of their technologies. Moreover, many SMEs in Italian districts have an international vocation in export activities, by successfully adopting an off-shoring strategy and creating an international subcontracting chain (Belussi, 2015). Thus startups can be supported to pursue their path toward internationalization, by gaining access to established distribution network and know how.

On the other hand SMEs obtain the advantage to relate themselves with innovative startups, that is a way to overcome their difficulties to innovate. Indeed, globalization implicates new directions of competition, companies coming from eastern countries as China and India become new rivals in the business arena beyond local competitors, proposing low-cost manufacturing products that threaten traditional SMEs sustainability. In the moment in which such a pressure is present in the market, price competition and product commoditization start dominating the market, but SMEs typically don't have the scope and scale to face this challenge (Vanhaverbeke, 2012). Therefore they must find new ways to differentiate their offering to continue making profits and not disappear. In this context, companies have two ways to escape form this trap: to renovate their value proposition implementing an internal resource-based approach, so relying in already existing internal entrepreneurial competences, otherwise they need to seek these strategic resources and new opportunities outside firm's borders. Here startups can play a key role, providing highly technological and innovative solutions which can help SMEs to undertake their path toward servitization, optimize internal processes and find new ways to communicate their production value to clients; so avoiding cost based approach that could lead to reduce or even make negative margins, by differentiating from competitor and gaining a unique position in the competitive space.

In addition to a tight collaboration, it is possible to gain benefits from simpler forms of relationship. Sure enough, startups and SMEs have many alternatives that can be undertaken, when needy of reciprocal support. When engaged in a supplier/customer relationship, many contracting forms can be established. A partnership is a form of vertical relation implying very high degree of commitment, that takes the most extreme when talking about joint ventures, in which the two companies also formalize their collaboration and join forces into a completely new enterprise. On the other extreme, the two

organizations work in a spot sales and purchases structure, but in the middle there exist a lot of agreements that lead the collaboration to different degrees of participation and contract formalization (Grant, 2016).

All these forms represent a way for the startup to sell their innovative products and services, enlarging their customer base, increasing their reputation in the market since a collaboration with a structured company represent an important signal of quality for a newborn startup. This can favor the triggering of other collaborations with other customers, but also it raises the attractivity toward capital market.

3.4.2 Collaboration Threats

Notwithstanding the complementary drivers and the inherent characterization to be flexible and informally structured, differences between startups and SMEs are not trivial or neglectable, since they could avoid collaboration to properly work. In the previous section, the determinants for the engagement have been described, now it is also necessary to mention what could let them prevent from gaining benefit from it.

So far, researchers dealt with this theme primarily to describe the difficulties that are verified when corporations implement an open innovation strategy addressing innovative startups. The hypothesis that has been made is that these threats could emerge also referring to a more balanced, but still asymmetric, relationship as between SMEs and startups; probably occurring with a lower impact.

Oughton, Mortara and Minshall in 2013 have listed the main challenges faced from both the two sides of the partnership, identifying the three most influential aspects that come to light during collaboration exchanges between a large and a small firm. These three main factors and sources of potential problem are culture, complexity and communication issues. They are easily reconnected to the SMEs and startup case, since again we can distinguish differences in scale, scope and internal degrees of complexity. Therefore, SMEs are reluctant to introduce innovation in their traditional processes, are preoccupied to burn resources, thus leading to a risk adverse culture; startups instead are used to adopt an experimental approach, based on low cost trial and errors enabled by the digital wave. While cultural problems are related to people mindset of two different organizations, complexity

issues instead are related to the complex network of stakeholders that are involved in the decisional process, who have different interests from their results. These of course complicate the relationship; in the case of startup, the deciding power is in the hands of founders, venture capitalists, business angels, family and friends, all with different goals and expectations. In more structured companies instead, this complexity is related to the people that are in charge of the different functions, who again have different incentives and they could gain benefits or damages depending on the function typology. Eventually, different cultures imply different languages and ways of communication. These can lead to difficulties in understanding the needs of the one and the other, mistakes and delays in deliveries. Not always the startup understands the roles of people in structured companies. If relating with a multiplicity of actors working for different functions of the SME, startup members may receive a different treatment depending on the specific goals that these functions have; resulting in chaotic situations.

All these obstacles need to be overcome or at least minimized in order to create the right climate and synergies to allow the collaboration to work and succeed. Under this goal, the two companies should invest time for developing a mutual understanding of objectives and relational capital to further satisfy needs. First of all, success is derived by the fact that the two organizations do not focus their efforts in agreements on monetary aspects, since it imply a loss of energy that is better to invest on value creation and delivery (Oughton et al, 2013). Then, the most structured company has to be able to understand its privileged position and decisional power over the startup, but at the same time must avoid exercising this power to exploit the startup only for their own goals. It is important that key players are employed as interface for a right communication, and do not change in time, otherwise the risk is that startup does not find any more a unique pivotal point to refer to, when coordination is needed or when problems emerge. This because if many actors are involved in the project development and they also change over time, different perspective can come into play and when the bedrock figure do not interface anymore, mistrust can arise.

Moreover, Usman and Vanhaverbeke (2016) sustain that probability to start a collaboration project and to succeed in effectively managing it, is greater when the entrepreneur or a startups manager has already dealt with a large reality in the past. This figure can play a pivotal role in establishing collaborative practices and in the negotiation phase. Indeed the

success of the collaboration, very often depends on the startup capability to negotiate with the large firms and not being totally under the willingness of the SME; also because after few years the larger company could master the technology internally and no longer need the startup support.

Finally, companies should be wise in the selection of the right collaborator, in order to select the one really able to strengthen their core technology and to develop complementary assets allowing to better access the market (Franco, 2003). If a strict partnership is not necessary for the provision of the complementary value, SMEs and startups can adopt a large variety of collaborative agreements that do not require high investment of money and time to establish relationship and synergies, allowing a less involvement of efforts (Grant, 2016). On the other hand, SMEs managers should focus high efforts just in the projects that are envisaged as embedding the right potential to create and develop sustainable innovation and can arise their competitiveness.

CHAPTER 4: EMPIRICAL ANALYSIS

The empirical analysis is based on studying how startups and SMEs are connected inside Italian Industrial Districts (IIDs). Indeed, by observing innovative startups concentration inside this peculiar kind of EE where SMEs are mainly concentrated, we indirectly show how important is the copresence and relationship between these two organization typologies, both from the firms' perspective and for the economy of the territory.

Moreover, we already talked about the importance of cognitive proximity, that is a process happening in the moment in which people share a common knowledge base and expertise, and in this way they are able to learn from each other (Boschma, 2005). Based on this definition, it is easy to associate a high level of cognitive proximity with a strong industry relatedness between firms. Indeed, there is consensus that the capacity to learn practices and to communicate inside a neighborhood is enhanced when the near companies belong to the same industry. On the other hand, a low level of industry relatedness implies a higher probability of complementarities among firms.

In the empirical analysis we conducted, we tried to gain insights about the concentration of innovative startups inside and in proximity of IIDs, compared with the other areas of Italy not characterized by industrial regions. Moreover, it has been studied the industry relatedness between the innovative startups, detected in the previous analysis, and the industry specialization of the IIDs themselves. To understand this phenomenon, two ways to categorize IIDs specialization have been used. The first method considered, for each district, 3 main specializations that are expressed through three different ATECO codes (consisting of 3 digits)[11]. The second one classified specialization of districts by assuming as a reasonable proxy the industry of operation of the SMEs located inside the IID itself.

Once performed this analysis, it could be attributed a high or low level of industry relatedness of IIDs with innovative startups localuized in the local area. If high, cognitive proximity can enhance company communication and they can leverage on a favored environment for mutual learning and knowledge exchange. If the degree of relatedness is

[11] https://www.istat.it/it/archivio/150320

low, then it will be more difficult to perform an efficient interchange of information to improve procedures, but on the other hand it could reveal an attractive opportunity to develop products and services across sectors, and therefore for developing synergies and complementarities, thanks to a different kind of collaboration.

4.1 Data and methodology

The analysis performed is based on innovative startups and their position in the Italian geography. In particular, it has been studied their relevance inside or in proximity of IIDs. To accomplish our purposes, external sources have been used and merged in order to create a classification for innovative startups basing on the position of their headquarter.

Italian government in 2012 has perceived the central role that innovative startups carry out in favor of sustainable entrepreneurship and innovation as a driver for economic growth. For this reason, it has been issued the Decree Law 221/2012 ('Italian Start-up Act'), through which the legislative framework has renewed to provide greater support to innovative entrepreneurship. This law permitted to empower new companies with the employment of new instruments, which aim to render a positive impact on the whole startup life cycle. Moreover, a special section of the firms' Register is dedicated to innovative startups, i.e. the Innovative Startups' Register. The Law Decree defined innovative startups as firms with shared capital (i.e. limited companies), not listed on a regulated market nor on a multilateral negotiation system. These companies must also meet the following requirements: be new or have been operational for less than 5 years; have their headquarters in Italy or in another EU country, but with at least a production site branch in Italy; have a yearly turnover lower than 5 million Euro; do not distribute profits; produce, develop and commercialize innovative goods or services of high technological value; are not the result of a merger, split-up or selling-off of a company or branch; be of innovative character, which can be identified by at least one of the following criteria:

1. at least 15% of the company's expenses can be attributed to R&D activities;

2. at least 1/3 of the total workforce are PhD students, holders of a PhD or researchers; alternatively, 2/3 of the total workforce must hold a Master's degree;

3. the enterprise is the holder, depositary or licensee of a registered patent (industrial property) or the owner of a program for original registered computers. ("Executive Summary of the new Italian legislation on innovative startup", Italian Ministry of Economic Development, 2016[12])

The database of innovative startups enrolled in the register is publicly available. This investigation considered 9931 enterprises[13], classified by industries through ATECO 2007 code[14], a classification of the economic activities through an alphanumerical combination; in which letters identify macro sectors (section), while six digits represent different level of details and subcategories of activities belonging to the same macro sector (division, group, class, categories and subcategories). *Table 1* and *Table 2* classify our sample by year of registration at the Chamber of Commerce and by industry, considering the division categorization of the ATECO code (the first 2 digits).

Table 2: Year of registration of startups

Year of registration	No.	%
2019	372	3,8%
2018	2515	25,3%
2017	2459	24,8%
2016	1759	17,7%
2015	1467	14,7%
2014	1130	11,4%
2013	216	2,1%
2012	11	0,11%
2011	2	0,02%
TOT	9931	100%

[12] https://www.mise.gov.it/images/stories/documenti/Executive%20summary%20ISA%2007_2019.pdf
[13] Updated to 04-03-2019
[14] https://www.istat.it/it/archivio/17888

Table 2: Two digits sector specialization of innovative startups

2 Digits	Sector	Activity	No.	%
62	Services	J 62 Software Production, Computer Consultancy	3419	34.43%
72	Services	M 72 Scientific Research And Development	1340	13.49%
63	Services	J 63 Activities Of Information Services And Other Services	918	9.24%
74	Services	M 74 Other Professional, Scientific And Technical Activities	325	3.27%
28	Industry/Craft Sector	C 28 Manufacture Of Machinery And Equipment	319	3.21%
26	Industry/Craft Sector	C 26 Manufacture Of Computers And Electronics Products	308	3.10%
70	Services	M 70 Business Management And Advisory Activities	265	2.67%
71	Services	M 71 Activities Of Architectural And Engineering Studies	252	2.54%
47	Trade	G 47 Retail Trade	185	1.86%
58	Services	J 58 Editorial Activities	171	1.72%
46	Trade	G 46 Wholesale Trade	169	1.70%
27	Industry/Craft Sector	C 27 Manufacture Of Electrical Equipment	167	1.68%
32	Industry/Craft Sector	C 32 Other Manufacturing Industries	162	1.63%
82	Services	N 82 Support Activities For Office Functions And Others	145	1.46%
73	Services	M 73 Advertising And Market Research	126	1.27%
10	Industry/Craft Sector	C 10 Food Industries	96	0.97%
35	Services	D 35 Supply Of Electric Energy, Gas, Steam And Air	95	0.96%
20	Industry/Craft Sector	C 20 Chemicals Manufacture	90	0.91%
25	Industry/Craft Sector	C 25 Manufacture Of Metal Products	88	0.89%
85	Services	P 85 Education	84	0.85%
30	Industry/Craft Sector	C 30 Manufacture Of Other Transportation Means	79	0.80%
79	Tourism	N 79 Travel Agency Services And Tours	75	0.76%
59	Services	J 59 Cinematographic Production And Post Production	60	0.60%
22	Industry/Craft Sector	C 22 Manufacture Of Rubber And Plastic Materials	57	0.57%
43	Industry/Craft Sector	F 43 Specialized Construction Work	57	0.57%
14	Industry/Craft Sector	C 14 Packaging Of Clothing Items; Packaging Of Leather And Fur Coat Items	52	0.52%
29	Industry/Craft Sector	C 29 Manufacture Of Motor Vehicles, Trailers And Semi-Trailers	48	0.48%

1	Agriculture/Fishing	A 01 Agricultural Crops And Production Of Animal Products	46	0.46%
61	Services	J 61 Telecommunication	41	0.41%
77	Services	N 77 Rental And Operating Leasing Activities	41	0.41%
56	Trade	I 56 Activities Of Catering Services	40	0.40%
41	Industry/Craft Sector	F 41 Building Construction	38	0.38%
86	Services	Q 86 Sanitary Assistance	35	0.35%
23	Industry/Craft Sector	C 23 Manufacture Of Other Non-Metallic Mineral Products	33	0.33%
96	Services	S 96 Other Services For The Persons	31	0.31%
38	Services	E 38 Collection, Treatment And Disposal Activities	29	0.29%
31	Industry/Craft Sector	C 31 Manufacturing Of Furniture	28	0.28%
N.D.		Not Classified	28	0.28%
88	Services	Q 88 Non-Residential Social Assistance	27	0.27%
15	Industry/Craft Sector	C 15 Manufacture Of Leather Items	26	0.26%
16	Industry/Craft Sector	C 16 Wood And Cork Industries (Furniture Excluded), Manufacturing Of Straw Articles And Plaiting Materials	25	0.25%
52	Services	H 52 Storage And Transport Support Activities	24	0.24%
33	Industry/Craft Sector	C 33 Repair, Maintenance And Installation Of Machinery And Equipment	23	0.23%
90	Services	R 90 Creative, Artistic And Entertainment Activities	22	0.22%
18	Industry/Craft Sector	C 18 Printing And Reproduction Of Recorded Media	21	0.21%
13	Industry/Craft Sector	C 13 Textile Industries	18	0.18%
11	Industry/Craft Sector	C 11 Beverage Industries	17	0.17%
21	Industry/Craft Sector	C 21 Manufacture Of Basic Pharmaceutical Products	15	0.15%
55	Tourism	I 55 Housing	14	0.14%
93	Services	R 93 Sports And Entertainment Activities	14	0.14%
68	Services	L 68 Real Estate Activities	12	0.12%
45	Industry/Craft Sector	G 45 Wholesale And Retail Trade And Repair Of Motor Vehicles And Motorcycles	11	0.11%
64	Services	K 64 Financial Services (Insurance Excluded)	11	0.11%
2	Agriculture/Fishing	A 02 Forestry And Use Of Forest Areas	10	0.10%
17	Industry/Craft Sector	C 17 Paper Manufacturing And Paper Products	9	0.09%
66	Services	K 66 Activities Ancillary To Financial Services And Insurance Activities	9	0.09%
87	Services	Q 87 Residential Social Assistance	8	0.08%
91	Services	R 91 Activities Of Libraries, Archives, Museums And Others	8	0.08%

78	Services	N 78 Personnel Research, Selection And Supply Activities	7	0.07%
42	Industry/Craft Sector	F 42 Civil Engineering	6	0.06%
60	Services	J 60 Broadcast And Transmission Activities	6	0.06%
24	Industry/Craft Sector	C 24 Metallurgy	5	0.05%
36	Services	E 36 Collection, Treatment And Supply Of Water	5	0.05%
3	Agriculture/Fishing	A 03 Fisheries And Aquaculture	4	0.04%
53	Services	H 53 Postal And Courier Services	4	0.04%
81	Services	N 81 Services Activities For Buildings And Landscape	4	0.04%
94	Other Service Activities	S 94 Activities Of Associative Organizations	4	0.04%
39	Services	E 39 Recovery And Other Waste Management Services	3	0.03%
49	Services	H 49 Land Transport And Pipeline Transport	3	0.03%
69	Services	M 69 Legal And Accounting Activities	3	0.03%
75	Services	M 75 Veterinary Services	3	0.03%
95	Industry/Craft Sector	S 95 Repair Of Computers And Household Goods	3	0.03%
80	Services	N 80 Surveillance And Investigation Services	2	0.02%
7	Industry/Craft Sector	B 07 Extraction Of Metallic Minerals	1	0.01%
19	Industry/Craft Sector	C 19 Manufacture Of Coke And Petroleum Products	1	0.01%
37	Services	E 37 Management Of Sewage Network	1	0.01%
Total			9931	100.00%

By giving a first sight to the classification made in *Table 2*, we can denote how the largest majority of innovative startups falls inside the first three sectors referring to service-connected activities (i.e. Software Production & Computer Consultancy, Scientific R&D, Activities Of Information Services & Other Services). Consequently, our analysis could be strongly influenced by the non-specificity of the categorization, since these three divisions of activities are probably too generic. On the other side, this information can be interpreted as the willingness for innovative startups to develop high level of knowledge into computer science and information and communication technologies in general; without specializing and applying these capabilities in some traditional sectors, and in order to be highly flexible

in responding to any client necessity. Moreover, the high percentage of innovative startups dedicated to scientific R&D, indicates the emergence of new experimental initiatives connected to applications such as energy and clean technologies or bio technologies.

By utilizing also a classification of the economic activities developed by Eurostat[15] (using NACE 2-digit code, the European version of ATECO nomenclature), we are able to distinguish the manufacturing industries according to technological intensity (High, Medium and Low Tech) and non-manufacturing activities (i.e. service industries) based on their level of knowledge intensity (Knowledge Intensive and Less Knowledge Intensive Services, where each is sub-divided into further sub-sectors). It is interesting to assess what is the technological and knowledge level of operation of the startups in our sample (see *Table 3*, in which the categories are organized in decreasing order).

Table 3: Technological/Knowledge Intensity of innovative startups

Technology/Knowledge Intensity	**No of startups**	**%**
High Tech Knowledge Intensive Services	5784	58.24%
Knowledge Intensive Market Services	980	9.87%
Less Knowledge Intensive Market Services	726	7.31%
Medium-High Tech	703	7.08%
Low Tech	454	4.57%
Other Knowledge Intensive Services	372	3.75%
High Tech	323	3.25%
Not classified	323	3.25%
Medium-Low Tech	207	2.08%
Other Less Knowledge Intensive Services	39	0.39%
Knowledge Intensive Financial Services	20	0.20%
Total Services	7921	79.76%
Total Manufacturing	1687	16.98%
Total Not classified	323	3.25%
Total	9931	100%

[15] https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf

It is evident that the tendency of startups operations is directed toward high level of technology and knowledge intensity, while just a small percentage is oriented into processes of low tech and less knowledge intensive. It is sufficient to see that about 58% of innovative startups are inside the class of High-Tech Knowledge Intensive Services, including: Motion picture, video and television program production, sound recording and music publish activities; Programming and broadcasting activities; Telecommunication; Computer programming, consultancy and related activities; Information service activities; Scientific research and development.

4.2 Assessing geo-proximity

To study the geographical configuration of innovative startups in the Italian territory, the ISTAT (Italian Institute of Statistics) classification of Labour Market Areas (LMAs) has been adopted (La nuova geografia dei sistemi locali - ISTAT, 2015).

LMAs are functional geographical areas, identified and delimited upon the entire national territory, which satisfy criteria based on labor demand and supply. This tool for region demarcation has been largely adopted by scholars, since LMAs better represent horizontal spatial interaction, that are fluxes of commuting that quantify the number of movements from the living to the working place of employees.

This model of territory partitioning, based on the maximization of social-economic spatial interactions, counterposes with the traditional administrative geography, that is built on vertical and hierarchical configuration. The advantages that this framework provide are related to a more efficacious representation of the labor market; since it is commonly recognized that regional administrative boundaries (cities, provinces and regions) are static and a result of historical and political circumstances rather than reflecting social and economic dynamics of the present days. Following these lines of reasoning, LMAs can offer higher value and insights for governors to take territory specific measures and decisions on investments and project development.

In 2011, the Italian Institute of Statistics (ISTAT) has identified 611 LMAs (also known as Local Labour Systems). From a technical point of view, LMAs are functional regions obtained through aggregation of two or more municipalities (used as elementary units) and

maximizing the interaction between them. Such a characteristic makes this configuration adequate for analysis of socio-economic phenomena and their evolution in time. The algorithm that ISTAT adopted for LMAs generation considered the criteria of self-containment, meaning that fluxes of commuting between the municipalities inside and outside the LMA are limited in number, and integration, meaning that the movements of workers are substantial between municipalities inside the same LMA.

LMAs are particularly suited for our purpose since starting from them, 141 Industrial Districts have been also defined. As a result, LMAs can be distinguished into two main categories: "district LMAs" (D_LMAs) and "not district LMAs" (NO-D_LMAs).

Considering the purpose of this study, we focused on information about localization, industry of operation of innovative startups, and industry of specialization of IIDs.

Table 4 shows how IIDs and our entire sample of innovative startups are located on the Italian country, divided in 5 areas (North-West, North-East, Central Area, South, Islands).

Table 4: Geographical Distribution of IIDs and innovative startups

Geographical Area	Number of Districts	% of Districts	Number of Startups	% of Startups
North-West	37	26.2%	3,196	32.2%
North-East	45	31.9%	2,224	22.4%
Central Area	38	27.0%	2,078	20.9%
South	17	12.1%	1,790	18.0%
Islands	4	2.8%	643	6.5%
Total	141	100%	9,931	100%

We also tried to represent the geographical view of Italy divided by LMAs and innovative startups contained. To this aim, Tableau software has been used for maps construction. *Figure 1* returns the Italian map, viewed through the LMAs boundaries and assigning a different color intensity, depending on the number of new ventures located in each area; *Figure 2* depicts the same information underlining just the D_LMAs areas. These two maps have been combined with the lists of the first twenty LMAs and D_LMAs containing the

highest number of startups (*Table 5* and *Table 6* respectively). Each LMA takes the name of the municipality creating the highest number of workplace among the ones inside the LMA itself.

Figure 1: Startup concentration on LMAs

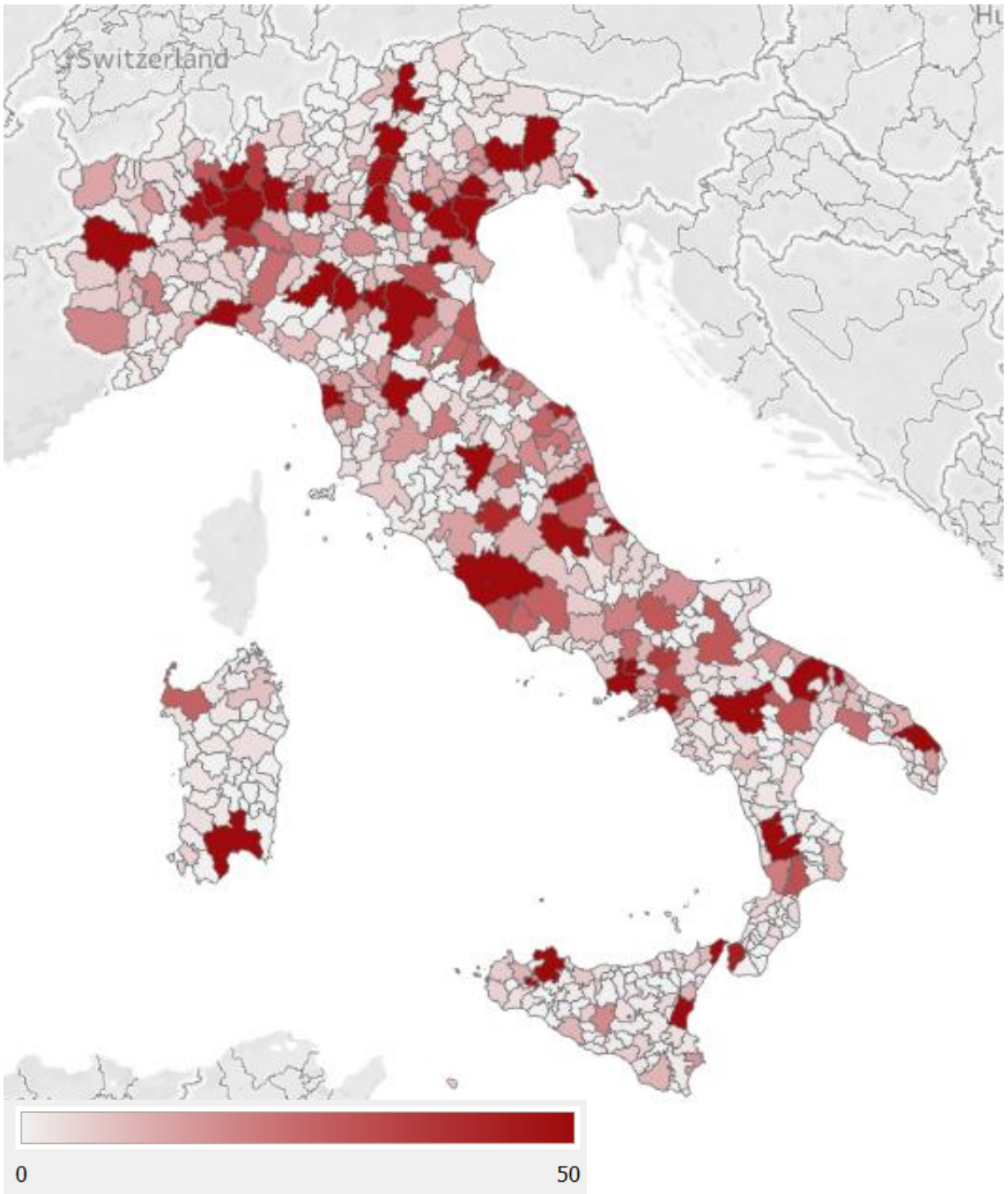


Figure 2: Startup concentration on D_LMAs

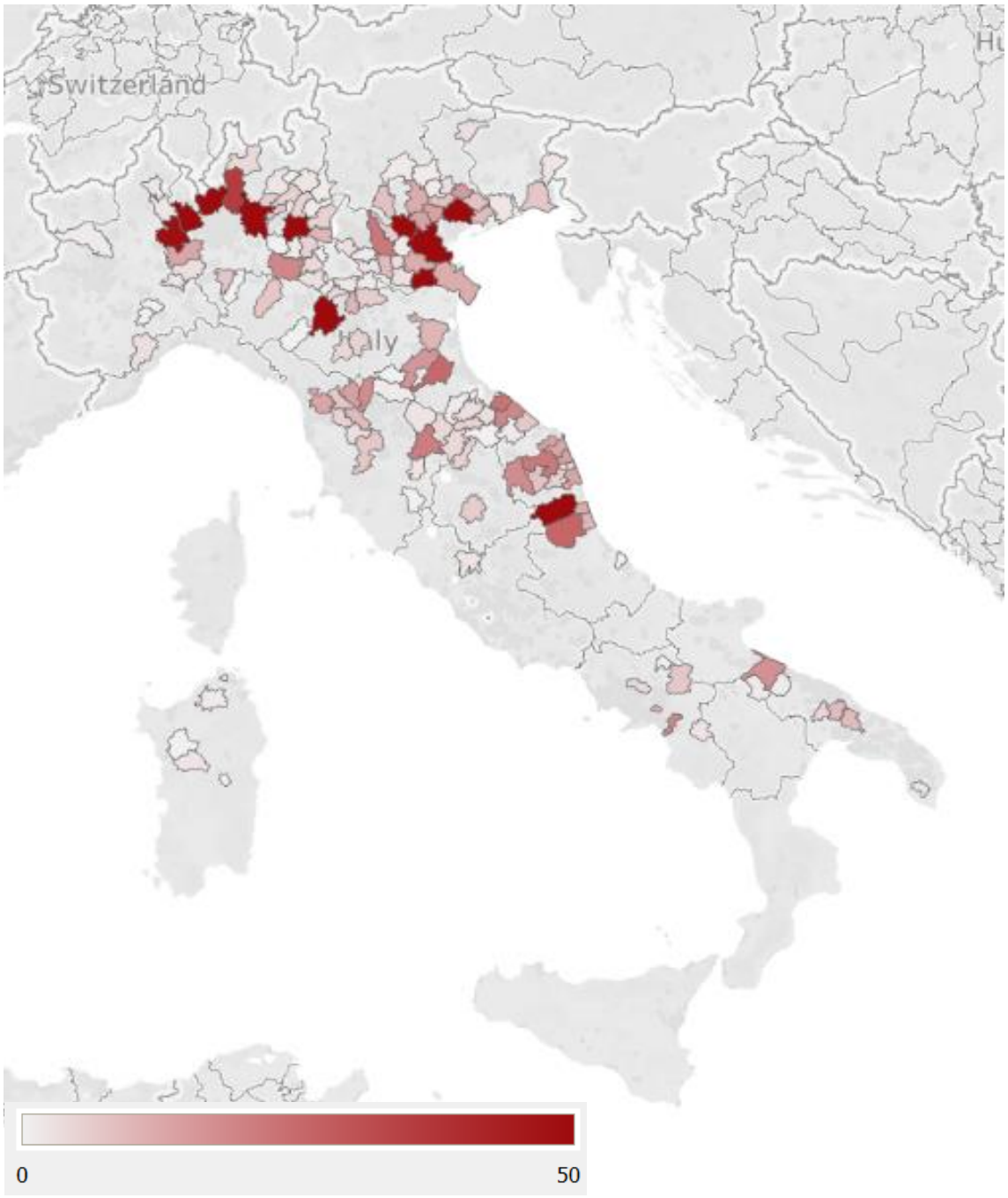


Table 5: Top 20 LMAs by number of innovative startups

LMA	Number of startups	LMA Typology
Milano	1819	NO-D_LMA
Roma	962	NO-D_LMA
Napoli	326	NO-D_LMA
Bologna	292	NO-D_LMA
Torino	291	NO-D_LMA
Padova	217	D_LMA
Bergamo	158	D_LMA
Verona	141	NO-D_LMA
Palermo	141	NO-D_LMA
Firenze	140	NO-D_LMA
Genova	131	NO-D_LMA
Bari	117	NO-D_LMA
Salerno	111	NO-D_LMA
Cagliari	99	NO-D_LMA
Catania	97	NO-D_LMA
Brescia	94	D_LMA
Modena	90	NO-D_LMA
Trento	88	NO-D_LMA
Venezia	88	NO-D_LMA
Treviso	81	D_LMA

Table 6: Top 20 D_LMAs by number of innovative startups

LMA	Number of startups	LMA Typology
Padova	217	D_LMA
Bergamo	158	D_LMA
Brescia	94	D_LMA
Treviso	81	D_LMA
Reggio Nell'Emilia	67	D_LMA
Rovigo	66	D_LMA
Busto Arsizio	62	D_LMA
Como	58	D_LMA
Ascoli Piceno	54	D_LMA
Vicenza	53	D_LMA
Novara	49	D_LMA
Lecco	36	D_LMA
Teramo	26	D_LMA
Forlì	25	D_LMA
Pesaro	23	D_LMA
San Bonifacio	22	D_LMA
Macerata	22	D_LMA
Arezzo	21	D_LMA
Cremona	19	D_LMA
Fano	19	D_LMA

Additionally to this distinction made by ISTAT, the thesis proposes a third and a forth configuration of districts, named "extended district LMAs-first crown" (DE1_LMAs) and "extended district LMAs-second crown" (DE2_LMAs), which represent the areas expanding "district LMAs" across directly neighboring/contiguous municipalities (first crown) and next to the ones directly contiguous (second crown). To this end, a contiguity matrix published by ISTAT has been utilized.

Figure 3 and *Figure 4* represent the Italian territory divided by DE1_LMAs and DE2_LMAs respectively. Municipalities aggregated to districts are shown in green.

Figure 3: Extended district LMAs-first crown

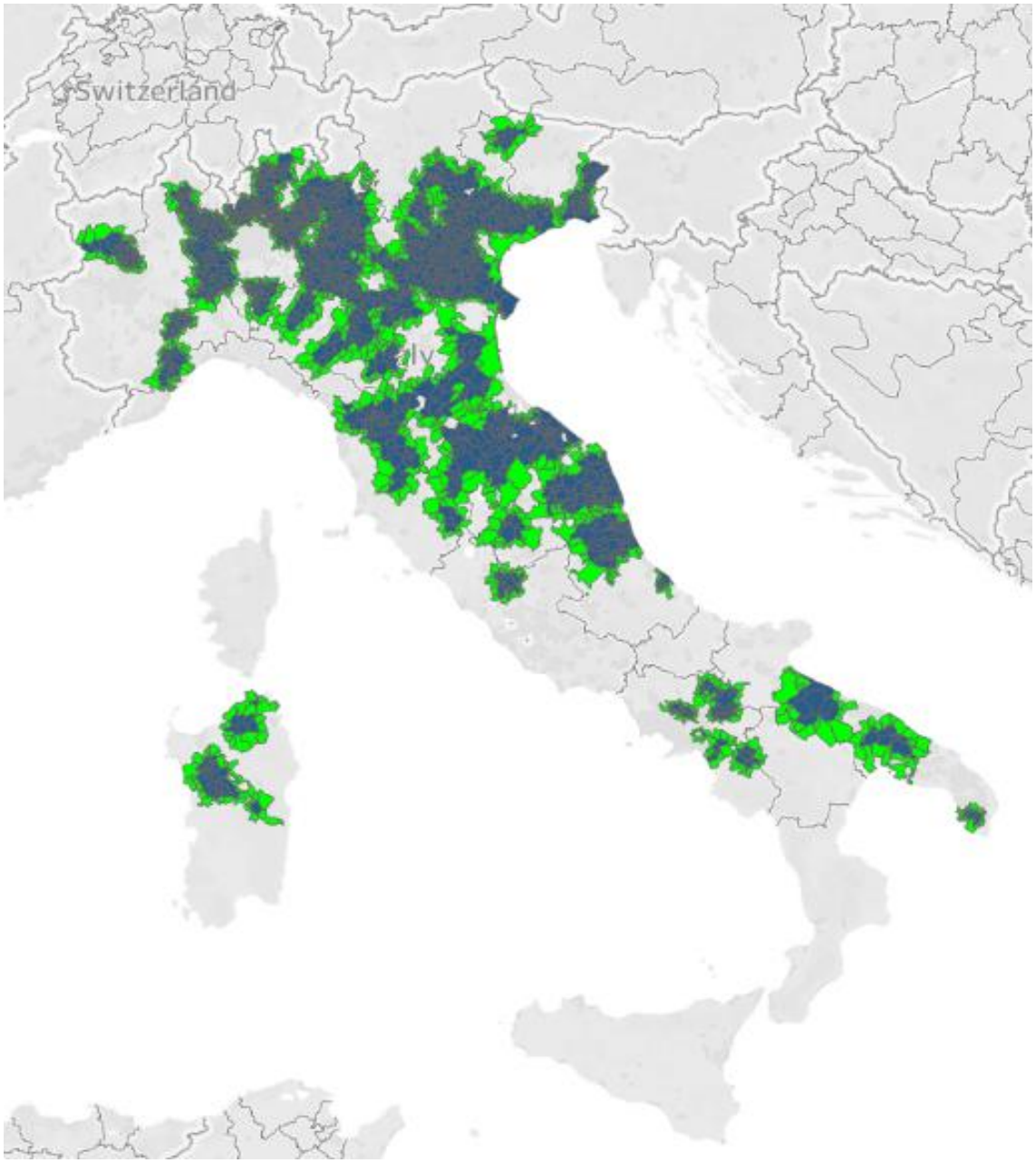


Figure 4: Extended district LMAs-second crown

The assessment of geo-proximity has been carried out by measuring the distribution of innovative startups in the four aforementioned LMAs typology (i.e. NO-D_LMAs, D_LMAs, DE1_LMAs, DE2_LMAs).

4.3 Assessing industry relatedness

To understand if there is connection between innovative startups formation and the specialization of IIDs, the method that has been adopted was to verify whether industry relatedness subsists between innovative startups and the IIDs in which they are located or closed to. For our purpose, industry relatedness has been assessed by using the ATECO code, despite its limitations and its simplicity. This choice has been taken due to the fact ATECO code is the only available metric expressing both the industry of belongingness of innovative startups and the specialization sector for IIDs. ATECO code is an alphanumerical code and the aggregation of its letter and digits refer to different level of detail: the section (the letter), the division (2 digits), the group (3 digits), the class (4 digits), the category (5 digits), the sub-category (6 digits).

Many information about activities of innovative startups do not present the detail about group, class, category and subcategory, but they just stop to the division level. For this reason, also our analysis concentrate more on this degree of aggregation of economic activities.

For what regard the assessment of industry specialization of D_LMAs, ISTAT identified a selection of 11 macro sectors: textile and clothing; leather and footwear; household goods; jewelry, goldworking, musical instruments, etc.; food industries; mechanical industry; metallurgical industry; chemical, petrochemical and rubber products; transportation industry; papermaking and polygraph industries; other manufacturing industries. *Table 7* counts how many D_LMAs are specialized in each macro sector.

Table 7: Macro Sector Classification of IIDs

	Macro Sector	Number of districts	% of Districts
1	Textile and clothing	32	22.70%
2	Leather and footwear	17	12.06%
3	Household goods	24	17.02%
4	Jewelry, goldworking, musical instruments, etc.	4	2.84%
5	Food industries	15	10.64%
6	Mechanical industry	38	26.95%
7	Metallurgical industry	4	2.84%
8	Chemical, petrochemical and rubber products	5	3.55%
9	Transportation industry	0	0.00%
10	Papermaking and polygraph industries	2	1.42%
11	Other manufacturing industries	0	0.00%
Total		141	100%

Here below, two options have been taken into consideration in the analysis for industry relatedness assessment.

For the first way of classification, the thesis looked at the three district principal industries (DIP1, DIP2, DIP3) deriving from the main macro sector. More specifically, they are the three main groups of economic activities prevailing in each district (expressed by 3 digits of ATECO code). *Table 8* illustrates the detail of this categorization of D_LMAs, by considering for simplicity, just 2 digits of the ATECO code related to DIP1.

Table 8: ATECO-2 Digits Classification of Districts by DIP1

2 Digits DIP1	Sector	Number of districts	% of Districts
10	Food Industries	14	9.93%
11	Beverage Industries	1	0.71%
13	Textile Industries	9	6.38%
14	Packaging Of Clothing Items; Packaging Of Leather And Fur Coat Items	23	16.31%
15	Manufacture Of Leather Items	17	12.06%
16	Wood And Cork Industries (Furniture Excluded), Manufacturing Of Straw Articles And Plaiting Materials	2	1.42%
17	Paper Manufacturing And Paper Products	1	0.71%
18	Print And Reproduction Of Recordered Media	5	3.55%
19	Manufacture Of Coke And Petroleum Products	1	0.71%
20	Production Of Chemicals	2	1.42%
22	Manufacture Of Rubber And Plastics	2	1.42%
23	Manufacture Of Other Non-Metallic Mineral Products	15	10.64%
24	Metallurgy	6	4.26%
25	Manufacture Of Metal Products (Excluding Machinery And Equipment)	10	7.09%
26	Manufacture Of Computers And Electronics And Optics Products; Electromedical Equipment, Measuring And Clock Equipment	8	5.67%
27	Manufacture Of Electrical Equipment And Equipment For Non-Electrical Domestic Use	8	5.67%
28	Manufacture Of Machinery And Equipment Not Encoded Elsewhere	4	2.84%
29	Manufacture Of Motor Vehicles, Trailers And Semi-Trailers	1	0.71%
31	Manufacturing Of Furniture	2	1.42%
32	Other Manufacturing Industries	8	5.67%
95	Repair Of Computers And Household Goods	2	1.42%
TOTAL		141	100.00%

By combining the ATECO code of the DIP1 of each D_LMA with the NACE classification from Eurostat[16] already seen in the section 4.1, we are able to estimate the

[16] https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf

degree of Technology and Knowledge intensity also inside IIDs (*Table 9*). Again they have been put by decreasing the number of districts contained in the class.

Table 9: Technology/Knowledge Intensity of DIP1 in IIDs

Technology/Knowledge Intensity	No of districts	%
Low Tech	82	58.2%
Medium-Low Tech	34	24.1%
Medium-High Tech	15	10.6%
High Tech	8	5.7%
Less Knowledge Intensive Market Services	2	1.4%
Total	141	100.0%

As we expected, the 82.3% of D_LMAs has the first principal industry characterized by Low or Medium-Low Tech, then just the 5.7% belong to the High Tech class. Also in this classification it is noteworthy the predominant manufacturing nature, while just 2 on 141 districts is endowed with a DIP1 related to Less Knowledge Intensive Market Services (in our particular case, both associated with the Repair Of Computers And Household Goods sector).

The second method consists in considering a set of ATECO codes associated to each main macro sector, extracted by studying the industries of the SMEs populating the D_LMAs (*Table 10*).

Table 10: ATECO Codes of SMEs associated to Macro Sectors

	Macro Sector	Set of ATECO
1	Textile and clothing	13, 14
2	Leather and footwear	15
3	Household goods	16, 23, 31, 3291, 32994, 9524, 9529
4	Jewelry, goldworking, musical instruments, etc.	264, 3211, 3212, 322-324
5	Food industries	10, 11, 12
6	Mechanical industry	182, 2453, 2454, 25, 261-263, 265-267, 2711, 2712, 2720, 2731, 2732, 274, 275, 279, 28, 29310, 304, 325, 3311-3314, 332, 9512, 9522
7	Metallurgical industry	241-243, 2441-2445, 2451, 2452
8	Chemical, petrochemical and rubber products	19, 201-204, 2052-2060, 21, 22, 2446, 268, 2733, 32991
9	Transportation industry	291, 292, 29320, 301-303, 30911, 30912, 30921-30923, 30990, 3315-3317, 38312
10	Papermaking and polygraph industries	17, 181, 581, 59201, 59202
11	Other manufacturing industries	20510, 30924, 3213, 32992, 32993, 32999, 3319, 38311, 3832

4.4 Empirical Evidence

The analysis conducted on the number of startups located in each typology of LMA, can allow us to deduce interesting insights.

Table 11 provides information about how startups are distributed among the LMA categories, about population and dimension of the areas contained in each LMA typology expressed in Km^2. While the LMAs have been defined in 2011, data about population refers to the year 2016.

Table 11: Startups, Population and Area (Km²) of the LMAs typologies

LMAs typologies	Number of startups	% startups	Population 2016	% Pop.	Area (Km²)	% Area
NO-D_LMAs	8,114	81.70%	47,168,200	77.75%	241,705.60	80.02%
D_LMAs	1,817	18.30%	13,497,350	22.25%	60,367.24	19.98%
DE1_LMAs	2,998	30.19%	21,505,318	35.45%	111,138.54	36.79%
DE2_LMAs	5,293	53.30%	32,691,525	53.89%	161,909.84	53.60%
Total LMAs	9,931	100.00%	60,665,551	100.00%	302,072.84	100.00%

It is necessary to remind that the total number of LMAs is 611 and districts (D_LMAs) consist of 141 of them. When dealing with "extended district LMAs-first crown" (DE1_LMAs) and "extended district LMAs-second crown" (DE2_LMAs), they just incorporate the nearest municipalities, without increasing the number of LMAs inside their areas, thus remaining 141 in number for both the categories.

The first aspect that is indispensable to look at is how many startups, population and regions are clustered inside each LMAs typology. It is possible to observe that there is relevance about presence of startups inside districts, indeed they are accounted for the 18.3% over the totality of innovative startups inside Italian territory. Moreover, by enlarging the D_LMAs boundaries, including the first crown of municipalities, this number reach the 30% of the totality. This means that the positive influence of IIDs agglomeration economies should not be thought as a strictly localized phenomenon and it is not sufficient to be analyzed alone, instead areas in proximity of districts have to be considered when studying new venture creation and localization. This trend also exists for DE2_LMAs, where the percentage of startups included raises to 53.3%; but on the other hand this great growth is probably related to the fact that a too inclusive selection has been adopted. Indeed the DE2_LMAs consist of the 53.89% of Italian population and a coverage of 53.6% of the whole Italian territory. Furthermore, these numbers return a limited significance, since they are probably a hint about the influence of many other factors, external to the IIDs, as high startup presence because of inclusion of big urban realities fostering diversification externalities rather than specialization externalities.

Actually, it is rare that big cities are situated into district areas, their size and density of population increase diversity of knowledge, facilitating the exchanges across disparate but

complementary industries (Jacobs, 1969). IIDs also confirm this hypothesis, and by selecting the 10 most populated cities in Italy, no one of them belong to a district area (as shown by the *Table 12*).

Table 12: First 10 municipalities by population

Municipality	Population 2016	LMA Typology
Roma	2,864,731	DE2_LMA
Milano	1,345,851	NO-D_LMA
Napoli	974,074	NO-D_LMA
Torino	890,529	NO-D_LMA
Palermo	674,435	NO-D_LMA
Genova	586,655	NO-D_LMA
Bologna	386,663	NO-D_LMA
Firenze	382,808	DE2_LMA
Bari	326,344	DE2_LMA
Catania	314,555	NO-D_LMA

The most populated urban area belonging to a district is Padova and we need to go down until the 14th position, with a population of 210,401. It is also remarkable that three of the top populated cities (i.e. Roma, Firenze and Bari), which at first place are assigned to NO-D_LMAs, are subsequently included in the extended district LMAs-second crown, strongly influencing the outcome of his LMA category in terms of number of startups and industry relatedness with the district of allocation.

To deeper understand how much big cities affect our analysis, we also tried to gain further insights about the relevance of the *main* municipality inside each LMA. "La nuova geografia dei sistemi locali" (ISTAT, 2015) defined as *main*, the municipality offering the highest number of workplaces inside each LMA and it also derives the name.

In *Table 13* it's shown how many innovative startups locate in the main municipalities of LMAs. We can infer that NO-D_LMAs are characterized by a higher concentration of startups in their principal municipalities (78.65%) compared to D_LMAs, which conversely show on average a more spread distribution among the several municipalities inside the district (62.85%).

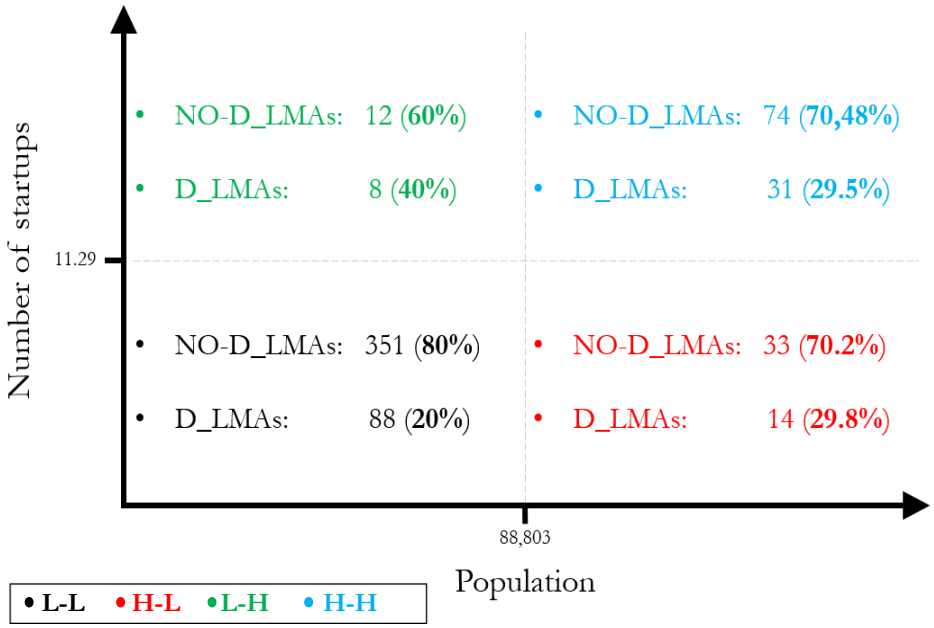
Table 13: Startups concentration inside the main municipalities of LMAs

Municipality	No of startups	No of startups in main municipality	%
NO-D_LMAs	8114	6382	78.65%
D_LMAs	1817	1142	62.85%
LMAs	9931	7524	75.76%

Starting from these initial considerations, the final reflection concerning geo-proximity of startups inside Italian regions regards the relation between population and the quantity of innovative startups inside LMAs. Undoubtedly, we expect to detect a positive correlation between density of inhabitants and new ventures presence (Armington and Acs, 2002); but a further view can be helpful to better understand the role of districts and urban realities in the Italian environment.

To this aim a 2x2 matrix has been conceived, by dividing LMAs into 4 classes: Low populated - Low new ventures (L-L), High populated – Low new ventures (H-L), Low Populated – High new ventures (L-H) and High populated – High new ventures (H-H). The parameters used to divide LMAs into the 4 classes has been calculated through a 10-periods moving average; in this way the outliers of the two attributes do not heavily affect the value of the parameters, returning 88,803 for population and 11.29 for innovative startups.

Figure 5: LMAs 4 classes for Number of startups and Population



As expected, the largest majority of LMAs are part of the L-L and H-H classes, verifying a positive correlation between population density and new venture creation. There is, however, a discreet number of LMAs, constituting the 11% of the population, that dissociate from these two main clusters.

To analyze this matrix, it is considered as a benchmark the number of D_LMAs in Italy (141) over the total number of LMAs (611), that is 23%. L-L class includes all the LMAs with low number of startups caused by low population, in this cluster the portion relative to D_LMAs (20%) is lower compared to the total percentage of D_LMAs in Italy. In the other three cases, the portion relative to the D_LMAs is higher than the benchmark. What is interesting to notice is related to the class L-H, that is the one including all the LMAs generating a high venture creation despite a low level of population. Notwithstanding its poorer relevance in terms of number of observations, compared to the other classes, it is important to highlight that the district component constitute the 40% of the total LMAs falling in that class. On the other hand, it is also quite high the percentage of D_LMAs in the section H-L of poor entrepreneurial initiatives with high population presence (29.8%), this can suggest a double face of the district areas, with a portion that is very productive in creating new opportunities for startups and other districts that are not a propulsive environment for entrepreneurs.

The second part of the empirical analysis studies the connection between IIDs sector of specialization and industry of activity of innovative startups. Also this further analysis has been performed on IIDs built by means of the LMAs. As already mentioned in the previous section, two ways for measuring industry relatedness have been adopted.

One of the two methodologies utilized in the thesis examined the correspondence between the ATECO code of innovative startups in IIDs and the sets of codes associated to the IIDs; gained by observing the specialization of activities in which SMEs populating the IIDs operate. Indeed, SMEs are the most prevalent kind of organization agglomerated inside districts and engaged into the manufacturing activities characterizing the local system. For this reason their sectors of belongingness are a good proxy for IIDs specialization. To have a wide initial view, correspondences have been first calculated just for D_LMAs at

different levels of aggregation of the ATECO: sections (alphabetical component), divisions (2 digits), groups (3 digits) and classes (4 digits).

Table 14 summarizes the obtained results. The industry relatedness between startups and SMEs is high (25%) at section level, but then, it decreases significantly by moving to higher level of industry classification (i.e. Division, Group, Class).

Table 14: Startups relatedness with SMEs - ATECO alphabetical code, 2, 3 and 4 digits

ATECO code categories	Number of startups	%
Intra Section	471	25.92%
Intra Division	194	10.68%
Intra Group	70	3.85%
Intra Class	17	0.94%
Total startup in D_LMAs	1817	100%

Total number of startups observed: 9931

Startups-SMEs relatedness has been deepened on the level of aggregation of the division (2 digits of ATECO code), by also trying to expand the analysis to DE1_LMAs and DE2_LMAs, as can be observed in the *Table 15*.

Table 15: Startups relatedness with SMEs by district typology - 2 digits ATECO code

LMAs typology	Number of startups	Number of correspondences	%
D_LMAs	1817	194	10.68%
DE1_LMAs	2998	291	9.71%
DE2_LMAs	5283	369	6.98%

Total number of startups observed: 9931

The second method has followed a similar imprinting of the previous one for studying relatedness, but different parameters have been utilized to define LMAs specialization. Indeed, in this second case we have considered the three Districts Principal Industries (DIP1, DIP2, DIP3) to estimate the specialization characterizing each IIDs. The assessment of relatedness has been calculated through the analysis of coincidence of innovative startups ATECO, with at least one among the three DIP codes assigned by ISTAT to the IIDs. As in the previous case, the 2 digits ATECO code has been adopted

and the research has been extended to all the three categories of districts, results are shown in *Table 16*.

Table 16: Startups relatedness with District Principal Industry - 2 digits ATECO code

LMAs typology	Number of startups	Number of correspondences	%
D_LMAs	1817	63	3.47%
DE1_LMAs	2998	109	3.64%
DE2_LMAs	5283	128	2.42%

Total number of startups observed: 9931

It is evident that the first method provides better results in term of number of correspondences, and therefore higher industry relatedness. This can be explained by the fact that the second method supposes that specialization inside districts is provided just by the dominant sector and its three main declination (the three principal industries). Yet, very often IIDs are endowed with more than just a single dominant sector; different clusters of SMEs operating in diverse segments make the IIDs a multi-specialized reality. Therefore the second classification could be too simplistic, while the first one reflects more successfully the reality of multiple specialization characterizing SMEs inside Industrial Districts.

Anyway, in both the cases it is possible to confirm the hypothesis that extended district LMAs-second crown (DE2_LMAs) are not relevant for our purposes since they include a too broad range of municipalities into account and since in both the tables it indicates very poor level of relatedness among firms compared to the other two clusters. Conversely, data about relatedness of the extended district LMAs-first crown (DE1_LMAs) are very comparable with the ones of D_LMAs, and in the second methodology it is even greater. This is a confirmation that districts influence and generate externalities that can involve also the nearest areas around the district itself.

But, there is not strong evidence about industry relatedness between startups and SMEs inside IIDs. At the same time, the ATECO code assigned to each innovative startup shows that the majority of startups in Italy perform in service-related industries; more specifically

in *Table 2*, the most relevant divisions of economic activity for startups are Software Production and Computer Consultancy (34,43%), Scientific Research And Development (13,49%), Activities Of Information Services And Other Services (9,24%). Therefore, just these 3 clusters of activity enclose more than the 50% of innovative startups and it is reasonable to think that no district is specialized in one of these four categories, since they are strongly characterized by a manufacturing nature.

CHAPTER 5: COLLABORATION CASE

5.1 Research Design

A qualitative approach has been adopted in order to study the complexity of the phenomenon (Yin, 2009). Indeed, this method is necessary in order to address a thematic poorly debated so far, as SMEs and startups collaboration is.

Following this line of reasoning, we thought that the best way to conduct the investigation was to find a single case of success; to interview the people involved in the partnership and try to understand which key successful factors could emerge. Eventually, it has been possible to deeply understand the why behind things (as the reason behind the genesis, the partner selection, the procedures adopted for communication and value creation), and how great the created benefits are.

5.2 Case Selection

It has been decided to elaborate a case study on collaboration between startups and SMEs because despite SMEs tends to open up their boundaries easier than large companies and adopt a network strategy more frequently with the aim of growing. This field (and in particular that of startups with SMEs) is strongly under-remarked. Indeed, it is easier for small firms to work together because they have similar decision-making processes, similar financial restrictions, and similar approach to go to market with new products (Vanhaverbeke et al., 2012).

The goal of our analysis is to provide evidences that startups and medium enterprises can adopt collaboration strategy and similar mechanisms can emerge to the one arising between large companies and SMEs.

The choice concerning the case study has been taken respecting the following fundamental points: the small and medium-sized enterprise must be born during the "first wave of

entrepreneurship", while the startup had to exploit digital technologies, enabling the SME to bring innovation into its traditional business. Eventually, the choice must be coherent with the work made on districts to support the relevance of agglomeration for innovation and growth.

It has been decided to search for a case in which a traditional business, born in the era of Industrial Districts, collaborated with an innovative startup, since it is interesting to analyse how SMEs face the digital challenges and if these particular type of engagement could allow them to transform their processes, products/services and even business model, and open the opportunities to enlarge their boundaries from local to global.

To accomplish our thesis goal, two firms that have been engaged into a partnership and respect the aforementioned points have been searched through secondary sources (i.e. search engines and reports) and by asking to our network of contacts and people specialized in information disclosures (i.e. journalists). The scarcity of academic researches about the startup-SME collaboration issue, is also reflected in the lack of known and reported cases. The only one, which has been found to be remarkable is the collaboration between the medium enterprise Bedeschi and Airlapp, an innovative startup. They won the SMAU Innovation Award[17] in 2018, a recognition reserved for the most innovative companies and realities on the Italian territory. This revealed the most suited case to deepen into.

To deeply understand the why behind the dynamics of the collaboration, two interviews have been conducted for analysing the collaboration case; the first to the Co-Founder and CEO of Airlapp, Antonio Longhin, the second one to the IT Manager of Bedeschi, Fabio Maggio. The two interviews have been fundamental to understand the double perspective of the innovative startup and of the SME, since some insights that emerged from the analysis are not perceived by the two parties with the same weight. This approach allowed us to have a more complete view of the partnership.

[17] https://www.smau.it/inquiry/questionnaire/premio-innovazione/

5.3 Case Description

Bedeschi Group is active from 1908 as engineering and production company of mechanical plants at international level. The headquarter is in Limena (PD), representing the group's centre for managing all business activities and where the biggest manufacturing facility is located. They also have a production site in Bergamo and Genova, while their foreign presence is characterized by subsidiaries in the United States (Miami, Kansas City) and Dubai in addition to several representative offices across the world. This network allows faster technical assistance and fast solutions for any client, but also a high control on sourcing process, spare parts availability and deep products knowledge.

The company is specialized in three main industries:

- Material handling: this sector includes movements through belt conveyors for different types of bulk materials (limestone, clay, coal, iron, cereals, chalk). One of the most important application concerns all about harbour logistics, on-shore and off-shore;
- Bricks: this is the sector of origins for the company and covers the supplying of plants and equipment for bricks and roof tile manufacturing; a complete range of clay processing machines, from quarry to preparation, aging storages, extrusion and tile pressing of any fired clay product, handling machines (automatic lines), dryers and kilns;
- Crane: to complete the port logistic offering, Bedeschi provides cranes for container handling, load and unload from ships, movements and warehousing inside terminals. Bedeschi offers a fully integrated solution for arranging a transhipment operation from the feasibility study to the final operation.

Nowadays, Bedeschi turnover accounted 95 million in 2018[18]. Globally, the team counts more than 350 people operating worldwide to support an export rate more than 90% of sales[19]. (86 million of Total Assets)

[18] https://aida.bvdinfo.com/version-2019102/Report.serv?_CID=121&context=31MFGO2T6BFUYJG&SeqNr=6
[19] https://www.bedeschi.com/bedeschi-world/

Although the European legislation could consider Bedeschi out of the parameters of small and medium-sized enterprise, I decided to consider Bedeschi a medium enterprise anyway. The reason of this assumption is that European regulation does not consider the type of industry firms belong to; distinction that is instead adopted in other countries, as USA.

The European Commission itself recognized that the definition of SMEs lacks a multitude of aspects which should be instead considered and included in order to formulate a more comprehensive regulation. As a matter of fact, a consultation, that lasted from 6 February 2018 to 6 May 2018[20], has been opened with the objective to evaluate and revise some aspects of the SME definition, considered "the structural tool to identify enterprises that are confronted with market failures and particular challenges due to their size, and therefore are allowed to receive preferential treatment in public support".

By example it has been published a feedback in the consultation section that calls for an increase of SME definition thresholds for agriculture machinery industry: in the last years, agricultural machinery changed significantly, partly due to the legislative burden on agricultural machinery to meet engines emission legislation and partly due to new innovations. These modern machines increased turnover and resulted in growth for many SMEs. However, these enterprises should still face the same structural challenges in the agricultural machinery industry. Therefore, thresholds of the SME definition should be raised to take these factors into account.

Basing on what aforementioned, it is reasonable to assume that the parameters distinguishing medium and small-sized from large companies should be different depending on the type of activity carried out. In this view, I decided to use the North American Industry Classification System (NAICS)[21] to categorize Bedeschi. Considering the ATECO code of the company, that is "289209 - Manufacturing of other machinery for mining, quarry and construction", and basing on the activities that Bedeschi carries out, the equivalent of the NAICS code could be: "333131 - Mining Machinery and Equipment Manufacturing", "333923 - Overhead Traveling Crane, Hoist and Monorail System Manufacturing", "333922 Conveyor and Conveying Equipment Manufacturing". For all

[20] https://ec.europa.eu/info/consultations/public-consultation-review-sme-definition_it
[21] https://www.sba.gov/sites/default/files/files/Size_Standards_Table.pdf

these three cases, Bedeschi should be part of the Small-Medium Enterprise range, since the threshold is placed at 500 employees for two of these classes and even at 1250 employees in the case of "Overhead Traveling Crane, Hoist and Monorail System Manufacturing".

This indispensable digression on legislative aspects allowed me to consider Bedeschi as a SME and to take into consideration the analysis of this considerable collaboration case with Airlapp.

Airlapp is an innovative startup, born in 2016 in Piove Di Sacco, near Padova by four young guys experts in informatics, marketing and finance. Airlapp is a Software house that studies and researches the most advanced mobile and web technologies suitable also for low and medium cost devices, in order to make them usable in a simple way.

The startup is specialized in the development of mobile apps in four main technologies[22]:

- Augmented Reality - A technology able to change the world we live in, by enriching it with virtual elements and information. The fields of application are expanding in time and range from architecture and art to marketing and manufacturing.
- Virtual Reality - A technology able to project a physical person into any location and environment, permitting to digitally live immersive activities and experiences in first person. Specifically, Airlapp deploys different kinds of technologies to satisfy any customer requirement and appropriate for the most state-of-the-art visors as Samsung Gear VR, HTC VIVE, Oculus Rift, Playstation VR and Google Cardboard.
- Native Apps - Allows to interface with cloud services, databases, managerial platforms. Complemented with Web Apps, they fulfil software infrastructures, which are able to improve company processes, innovate and provide the best technologies and solution in the market.
- Web Apps - Exploiting their know how on 3D modelling, graphics and control, Airlapp develop not just mobile apps, focusing on app web as configurators, dynamic websites, cloud infrastructures and web services.

[22] https://airlapp.com/

In 2017, Airlapp became an innovative startup following the launch of the Regiverse virtual reality platform, which allows anyone to upload a 3D model on www.regiverse.com and browse it with their smartphone in Virtual Reality.

The collaboration between the two companies has origins from a need that Bedeschi had: to better exhibit their machines and plants in fairs. Actually, Bedeschi and its competitors had very few alternatives to expose to stakeholders their installations, the most common ways were to show videos, photographs or, at most, inconvenient gears or plant components; considering the size of plants and the onerous transportation issues. Moreover, bringing an innovative solution that was able to solve this problem, would have implicated an enormous advantage in terms of number of clients attracted worldwide; given that export rate represents more than 90% of Bedeschi sales and almost 40 industry trade shows take place worldwide every year.

Encouraged by the potentiality of this opportunity, Bedeschi sought for a partner capable of transforming a ship-loader of 70 meters in height, composed with a 38 meters arm, or a crusher plant for mining into a digitized artefact. Airlapp demonstrated its competences and overcame Bedeschi expectations, succeeding in providing the first machinery requested in very few months, in time for the mining exhibition in Jakarta, Indonesia, in September 2017, collecting a great success. Airlapp did not just care about delivering the software solution, but also all the equipment that would be useful at the fair (as personalized cardboard and mobile chargers) and a training session to Bedeschi commercial people.

Such a solution allowed Bedeschi to show their machineries in virtual reality on smartphones, with the maximum of mobility and transportability, but also to make customers experience sensations never felt before and the possibility to relive them once the exhibition ended, through the complementary gadget and the downloadable app.

From that moment a collaboration was established, and many other machineries and plants have been replicated into this mobile form. Bedeschi is still proud of bringing to its exhibitions the best and unique technology, allowing this kind of operation up to now in the market.

5.4 Findings

5.4.1 Collaboration origin

The beginning of the collaboration is provoked by a necessity that Bedeschi had, that is to find a smart way to bring their installations and machineries to the trade shows. Bedeschi managers understood that by changing clients' perception of what Bedeschi actually offers, it would have brought the opportunity to create a strong competitive advantage against competitors. Indeed, as Bedeschi IT manager explained:

"We had the need to share in some shrewd way the different plants that we manufacture. We design and produce machineries for movement of raw materials, harbour logistics, and not only. As a consequence, these are plants of a great dimension, that can reach even 100 meters in height. Moreover, we have an international presence and an important exhibition activity, participating to almost 40 events per year. Both for business and marketing reasons, we wanted to differentiate from competitors' traditional way to expose, through brochures, pictures, or pieces of machineries."

Bedeschi would have had an important fair in Indonesia in few weeks and this short term available pushed them to find external partners, since it should have been impossible to create the solution internally for a lack of competences, a R&D activity not already started and a not already designed product and software structure. The most obvious choice of collaborator would have been the selection of a consolidated software company, but from the very words of Bedeschi IT manager:

"The lack of knowledge brings you to safer roads. We already reached out another more structured company, we were acquainted that they could have solved our problem and for this reason the choice was going in that direction. But then, I was also keeping my radars on Airlapp, since their reality appeared very interesting. By that moment we involved them just to understand if they could have had something to offer and if they might be interested in the project".

Indeed, Airlapp CEO has already worked with some Bedeschi managers in the past, and this acquaintance with some management components of the larger firm contributed to the positive starting of the collaboration. Moreover, the solution proposed by Airlapp best complied with Bedeschi requirements, indeed it had the potentiality to let the clients live an

immersive experience by exploiting the Virtual Reality (VR) technology, giving them the impression to physically find themselves inside installation plants and huge machineries:

"We realized that the solution they proposed was very innovative and different from what the market was offering. Other solutions either implicate heavy hardware to transport or were very costly".

Also, from the startup perspective, Bedeschi choice has been surprising, since, probably, the most rational and risk-free solution should have been a collaboration with a different kind of organization. Here below, the point of view of the startup CEO:

"It would have been easier to trust companies with greater financial solidity, elder, experienced and with a mature product. Instead we were a new-born company, with a higher intrinsic risk".

And by talking of this initial approach, emerged one of the most important challenge and difficulty that the startup had to deal with:

"In the beginning, we had very few things to offer, except for us as a group of people. For this reason, we had to convince them by showing who we are, what we were capable to do, our know how, our ideas. At that time, we were just developing Regiverse, what today is our VR platform".

The positive outcome emerged from the meeting, has been strongly facilitated by the innovative vision and culture of the key figure of Rino Bedeschi, CEO of the middle enterprise, who has been defined by Airlapp CEO as:

"A person able to understand the potentiality beyond things and to see the big picture"

And by Bedeschi manager as:

"Our CEO is always enthusiastic of everything is innovative, and he is able to foresee opportunities. Its dynamism and flexibility permit us to be so open and to bring inside the company this kind of innovation. I've never seen people like him, he also has a 360° competence and vision on each single software".

5.4.2 Collaboration Management

In the first place, the collaboration began with the design in VR of the Voestalpine shiploader, a plant high almost 70 meters for 500 tons. After the success of Jakarta fair, the project become so attractive that Bedeschi decided to convert many other of their plants in VR, resulting on a one and a half year of partnership.

The process of development that Airlapp applied for each machinery, followed the software engineering philosophy, as the very word of Airlapp CEO:

"At the beginning, a requirement analysis has been performed, to understand which objectives and level of performances Bedeschi wanted to reach. Then, we studied the devices on which this models had to run. Once performed this analysis, we proceeded to develop internally in Airlapp the models of their plants. To do that, we asked them to send photos, technical papers, videos of their machines while functioning, to recreate them with the maximum faithfulness on our application. For all of these phases we followed an Agile, combined with Kanban approach".

The strong level of autonomy of Airlapp in the development phase was crucial, since Bedeschi was very committed in other projects and didn't have much time and resources to follow up the evolution of the work. As regard, the IT manager stated:

"They adapted to us 100%, operating like our technical office. Once they got few inputs needed to start, they proceed autonomously. It has been quite an easy relation, they were absolutely dynamic and willing to participate to such a project, for this reason they did their maximum, working day and night".

Therefore, a key factor for the success of this collaboration project, has been the high level of involvement and passion of the innovative startup. Indeed, Airlapp took care of all the details that could have been represented a criticality for Bedeschi at the trade shows. They provided Bedeschi of all the tools necessary for a correct execution in fairs, as personalized cardboards, mobile chargers, technical support, training sessions. These are all things, that in a common relation could be neglected because not specified in the contract (and therefore there are no economic incentives) or for a lack of commitment. This behavior has been immensely appreciated, as Bedeschi manager said:

"It has been very important their enthusiasm, they really step in our shoes. It is not always easy to really understand what a client requests. They have been able to assess everything and prevent potential problems, by making the right question at the right time. They originated many ideas that solve potential problems, such as – what do you really want to show in the few minutes of experience? – you cannot be vague, in the moment in which the client puts on the visor, you have to show him the right things in the short time available, just what matters. And without their intuitions, we would have failed".

Geographical proximity is another component favoring faster communication and interaction, both to start the collaboration and to evaluate the main features that have been developed:

"It is very important to meet in person, especially when defining the engagement rules, economic agreements and objectives. Then, possible variations can be discussed remotely, but still it has been important to see progresses together".

Moreover, proximity gives also the possibility to establish a stronger relationship between agents. In fact, the success of a collaboration, is due to all the mechanisms of mutual trust and synergies that emerge in a context of fair work. The formation of these mechanisms is of course fostered by physical proximity, and enhanced by affinities that create even stronger relationship, going beyond the simple business objective. This last ingredient can be generated only through physical meetings. As reported by Bedeschi IT manager:

"In an era in which we are international, still territorial proximity is important. Many times, even if we live in an increasingly connected world, I can notice that meeting in person repays. Maybe because non-verbal language enters the game and you can appreciate people much more than by simply doing a Skype call".

5.4.3 Collaboration Challenges

Even in this success case, difficulties emerged both for the innovative startup and the SME. The main problem encountered by Airlapp is related to their dimension compared to Bedeschi. As aforementioned, Airlapp didn't have a ready to use software, and for this

reason it was not simple for them to start and support a negotiation, as Airlapp CEO explained:

"We were a few months old company, for this reason it was difficult to start bargaining with such a bigger company. For what regards technical aspects we were skilled, therefore all that issues have been solved quite easily; but on the other hand, the starting has been the most complicated part. We needed to be credible, but without an history we were tremendously disadvantaged. We really understood what it means to negotiate, also because the counterpart, Rino, was very tough, it was like a marble block that didn't show any emotion."

To overcome this obstacle it has been fundamental the figure of the IT manager of Bedeschi himself, who was the point of contact between the startup and the SME and acted as a sort of intermediary in the deal, as revealed by Airlapp CEO:

"To succeed in obtaining the Bedeschi CEO trust, it has been incredibly supportive the figure of Fabio, who I had already known before and has been a sort of "Angel" for us. A personal connection in that moment has been crucial to get a little bit more confidence that we needed".

On the other side, Bedeschi manager did not see difficulties in establishing the relationship, instead he highlighted how fast has been the agreement between the two parties, as a proof of the highly dynamism and flexibility that are the two keywords of this partnership:

"The deal really lasted 5 minutes. It has been like – ok, I need these things, in this time, is it feasible? What do you think? If this is the effort, can you do also this and this? – it has been great, if all the deals were conducted this way, we would collaborate only with startups."

Anyway, also Bedeschi found some threats along the way, indeed a lack of flexibility of the middle enterprise might have hindered the full exploitation of the potentiality generated from the collaboration with the startup. Bedeschi has been able to prevail on this threat by putting aside too much rigidity and to be more dynamic and direct in communication, without formalities. IT manager of Bedeschi on this regard said:

"We succeeded in being agile and lean, we skipped any kind of filter. But actually, this is in our DNA. One of our key success factor is being much more flexible than many other competitors. Also in our organization chart, we have the first line of managers, responsible of business units, and below there are all

the others. We are quite atypical in this market, in the sense that we operate as a big company, but until few years ago, if I say that we were small, it is not so wrong."

The other difficulty and risk for Bedeschi consisted in not having any kind of control on what Airlapp was developing:

"They told us what they would have made and the time for the fulfillment, but we didn't possess any kind of benchmark assuring their accuracy. We trusted them completely, but on the other hand we didn't have alternatives and time to change course".

However, they found in the dialogue the solution mitigating this risk of failure. The fallen of formality barriers allowed faster and easygoing communication for quick alignments and feedbacks in both directions. Moreover, a key for enabling this kind of communication has been a high degree of synergies and trust between people, as IT manager of Bedeschi underlined:

"Honesty is the first thing that needs to emerge when you want to establish a rapport. The best collaborations emerge when at first sight you understand that the person you have in front is kind and respectful. This does not mean that he/she has to become your best friend, but in a working context you can develop a more personal and participatory relation".

5.4.4 Collaboration impact

This case of collaboration has brought advantages of very different kind to both the firms. Of course the most obvious is the economic one, indeed the application has permitted Bedeschi to solve its need and better communicate the value of their plants, to increase their stands appeal and curiosity for participants in trade shows. The consequence is clear: growth in sales. As highlighted in the recent interview by the startup CEO:

"We provided them of an instrument that has solved many of their problems and allowed also to sell more. Just think that a harbor platform has been presented in VR to a very important client, and from that moment the deal started and concluded with the trade agreement. Also from our point of view, the realization of that first sale has been an enormous gratification".

On the other hand, an evident benefit for the startup has been the fulfillment of the Virtual Reality project which they were already conducting, more than the mare economic compensation. Indeed, Airlapp has strengthened its solution in a field of application very ample, given the range of plants that Bedeschi disposes; and challenging, since they never interfaced with such a structured and consolidated actor. In this perspective, they also experienced the opportunity to grow in what regard negotiation and client management. Airlapp CEO explained:

"It has been extremely constructive, it allowed us to collaborate with a company structured and consolidated in procedures. We had the possibility to really see how it works, what you can obtain from the industrial design of such a complex set of machineries and to understand and develop knowledge on 3D models and their mobile fruition".

The other great advantage and opportunity that the collaboration produced has been the visibility gained by Airlapp in partnering with a company renowned and affirmed in its sector. Indeed, Airlapp aim was not to earn from their work, but to gain an important reference and demonstrate that even such a young company, was able to develop valuable solutions.

This created the chance to enlarge their network to new actors willing to digitalize their products or processes, as affirmed by startup CEO:

"Bedeschi believed in our capabilities even when we were a group of guys without any reference. They also accepted to attend SMAU, creating high visibility around our company as thanksgiving for the work we made. This was the most important goal we sought to achieve".

The project undertaken by the two organizations last almost half and a year, with the reproduction in VR of all the plants and with other works concerning different technologies (as a desktop application). Anyway, it left the pride of having brought to the market something never seen before and neither the startup CEO nor the IT manager considered the collaboration ended. In fact the interchanges between the two companies continue, by frequently getting in touch and aligning on possible new projects and know how exchange, as reported by Bedeschi IT manager:

"If we need in the future, we will have no problem to engage them and ask them for assistance, or for a consultancy if they are not directly working for the solution. Eventually, they can foster us to renew our self, without innovation we go nowhere".

And by Airlapp CEO:

"The Virtual Reality life cycle is ended, but the collaboration still continue. We have an excellent relationship and if the future will give the possibility to develop other projects together, we know that the connection is already consolidated".

CHAPTER 6: DISCUSSION

Scholars agree on the debate that innovative startups formation is strongly affected by the actors that are engaged in the territory, forming the so-called entrepreneurial ecosystem (EE) (Spigel, 2017). Basing on this concept, many researches have concentrated on studying the connection formed by actors, and, in particular, the typical object of the analysis is how startups relate with the external environment to sustain their initial stages, their growth and their pursuit for a scalable business model.

Therefore it is possible to identify the EE operators that potentially are able to positively impact on new venture creation, that are other firms (i.e. multinational companies or SMEs), venture capitalists, banks, business angels - which crucial role is to provide financial support - venture incubators and universities, public sector (Mason and Brown, 2014).

However, the literature targeting how startups collaborate with SMEs is evidently unexplored; in a context as the Italian one, where SMEs represent about the 92%[23] of the total enterprises, very few corporates really adopt wise and serious strategies for sustaining entrepreneurial initiatives and the VC market is growing at a slow pace compared to other countries as France and Germany.

For this reason, our aim is to further the research on this kind of relationship, in order to open the opportunities for new directions and to improve and consolidate the insights proposed in this thesis. In the theoretical part of the work, we analyzed how relationship between companies is moving toward a more collaborative approach and how beneficial the relation between innovative startups and SMEs can be inside the EEs.

6.1 Relevance from IIDs

An empirical analysis has been conducted to provide relevance about Italian territory and context specificity inside Italian Industrial Districts (IIDs). This peculiar kind of Labor

[23] https://www.infodata.ilsole24ore.com/2019/07/10/40229/

Market Area (LMA) is strongly characterized by traditional SMEs specialized in manufacturing activities, and therefore it can be deemed a peculiar kind of EE. The descriptive analysis on geographical and industry proximity between SMEs and innovative startups points out the complexity of the Italian entrepreneurial environment. The results do not counterpose neither with Jacobs nor Marshall view of new venture formation; the first affirming that diversification more than specialization among nearly located firms foster entrepreneurial trends, while the second sustaining that agglomeration of organizations operating in the same industries facilitate information exchange and process improvements.

Our localization analysis of new ventures exhibit relevant presence of innovative startups inside or in proximity of IIDs, confirming the Marshall-Arrow-Romer (MAR) model assumption that specialization economies permit cognitive proximity and latent entrepreneurship (Caiazza et al., 2019), and SMEs concentration influences new entrepreneurial activities. On the other hand, also Jacobs' assertion that the urban contexts are even a more promising environment for creating new firms is partially confirmed, since our analysis showed that in non-district areas, the 78.65% of startups on average are localized inside the main municipality showing a high propensity to concentrate in large cities, while inside districts this percentage corresponds just to the 62.85% on average, meaning that startups are more homogeneously distributed on the territory. Following these lines of reasoning, we can infer that new venture creation in Italy can be driven by both specialization and diversification externalities.

Moreover, we found that the influence of IIDs is not constrained just to their borders, but also neighbor areas are affected by their presence; also industry relatedness seems to have contiguous effects with close localities. Instead, in the moment in which the boundaries are opened also to second-crown municipalities, this contiguity declines very fast, presumably due to an excessively broad inclusion. Lot of discontinuity has been also registered by studying LMAs propensity to accommodate innovative startups constitution. Indeed, when trying to grasp awareness about the relation between the population residing in the area and number of startups contained in LMAs (see *Figure 5* in *Section 4.4*), it has been discovered that the largest majority of LMAs in Italy (about 71.8%) has low level of both population and innovative startup presence, but of this category the 80% is constituted by non-district

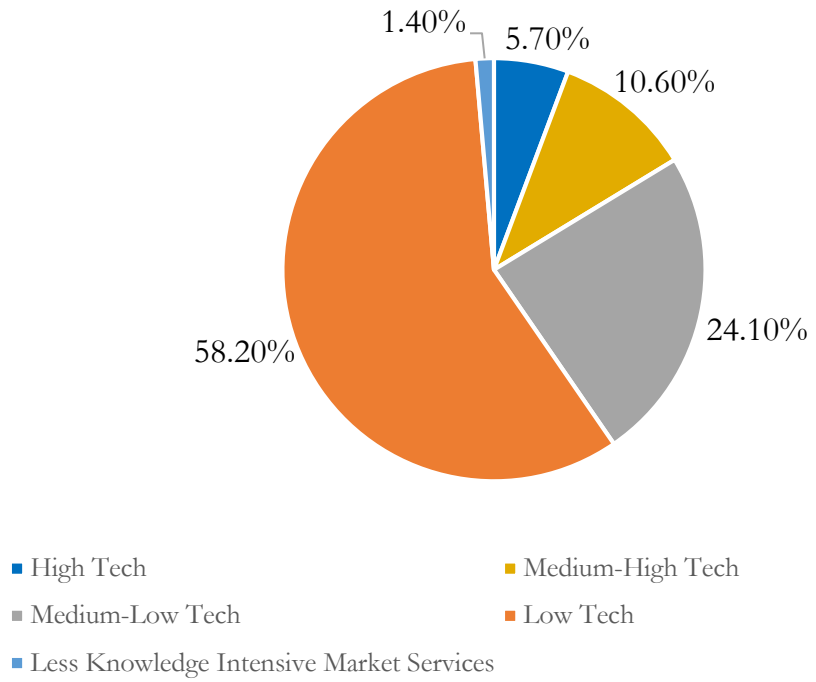
areas (i.e. NO-D_LMAs). In addition, the 7.7% of LMAs are characterized by poor startup presence notwithstanding they are highly populated. These two numbers combined indicates that just few LMAs (i.e. the remaining 20.5%) offer a fertile terrain for activating a process of new venture formation, and in this context it is interesting to analyze what is the size of impact generated by IIDs (D_LMAs). Numbers confirm that IIDs perform a crucial role in the Italian entrepreneurial ecosystem, and by analyzing the matrix in *Figure 5*, we can state that they represent the 31.2% of the portion of LMAs generating the highest rate of innovative startups presence. At the same time, it needs to be highlighted that there exists a significant part of D_LMAs which do not create an effective environment for small companies to innovate. In fact, the quantity of D_LMAs with poor startup concentration, despite a high degree of number of resident people, is considerably high; accounting to 14, meaning that almost 10% of IIDs has a great potential underdeveloped.

The second part of the empirical analysis addresses the thematic of industry relatedness between districts and innovative startup. Even though two different methods are proposed in the work, no strong evidence has been found. The methodology which resulted in better results, has been the one taking the industry of activity of SMEs populating the districts as a proxy for the specializations of IIDs, compared to the one considering the three principal industries (DIP) of the macro sector characterizing the IIDs. This poorness of industry relatedness is partially due to the fact that both the methods are strongly dependent from the well-known limitations of the ATECO code; in fact all our empirical evidences are based on how the innovative startups have been categorized by industry through such nomenclature. For this reason, future studies should try to overcome this issue.

Even though the results are not promising for deducting correlation between industry relatedness and number of startups inside IIDs, we should not interpret this information as a negative factor. In fact, notwithstanding the importance of cognitive proximity - providing to companies the possibility to easily learn from the one to the each other (Boschma, 2005) - a new wave of digital entrepreneurship can generate positive outcome, if the right degree of engagement between SMEs and startups is established.

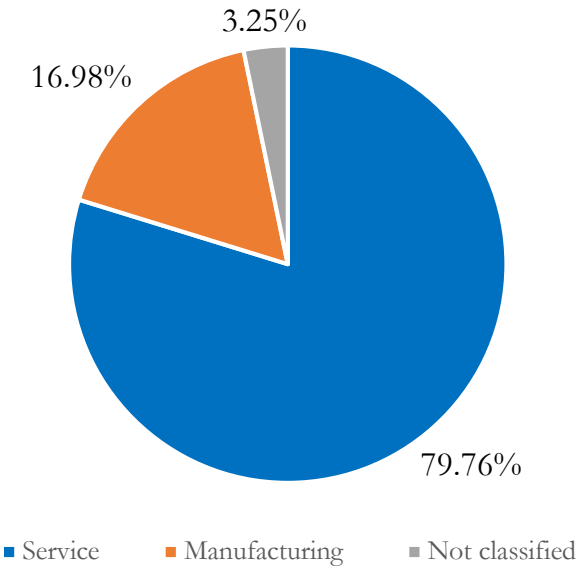
Numbers confirm that IIDs are strongly characterized by a manufacturing tradition and this heritage is carried on, with the 82,3% of IIDs mainly operating in Low or Medium-Low Tech manufacturing activities (see *Figure 6*).

Figure 6: Classification of IIDs by intensity of technology or knowledge



Instead, innovative startups are more inclined toward service-related activities than manufacturing ones (see *Figure 7*), more specifically High Tech Knowledge Intensive Services (58.24%) and Knowledge Intensive Market Services (9.87%), while just the 16.98% has a manufacturing characterization of both High and Medium-Low Tech (see *Table 3* for further details).

Figure 7: Activity classification of innovative startups



Therefore, the settlement of collaborations can be incentivized by the fact that startups and SMEs in districts operate in dissimilar but complementary industries and they do not consider the counterpart as a competitor but as potential partner for co-development, without destroying the culture and social mechanisms contradistinguishing IIDs.

Considerably high number of innovative ventures are located inside IIDs, that is a signal of quality to confirm the hypothesis that entrepreneurial dynamics are fostered by a substantial agglomeration and geographical closeness of SMEs; although there is no relevance about industry proximity. To further justify this reasoning, scholars argue that being too industry related may result in adverse reactions, reducing learning opportunities and innovation capabilities (Sapienza et al., 2004).

From the perspective of the traditional SMEs, having startups settled inside their area constitutes a big opportunity to cooperate and to introduce high technological and knowledge intensive solutions; in industries which are inherently low tech. These kinds of innovation make IIDs a potential flourishing climate for new venture creation and innovation. Furthermore, SMEs are typically more product than service oriented, and today customers demand for supplementary services that are able to enhance product value and facilitate its use. The servitization process may require a collaboration between traditional SMEs and innovative startups, that should lead to mutual benefits.

Therefore, the thesis also proposes a successful case of collaboration between an innovative startup and a SME, both located inside the same IID.

6.2 Procedures making the Collaboration work

Extant literature about collaboration focuses on how large and very large corporates are engaged with small and medium-sized enterprises. Especially, large corporates choose to create partnerships with startups, in order to rise their innovation capabilities, exploiting very often their favoured position of power against the small enterprise (Weiblen and Chesbrough, 2015). In this particular example of relationship, each part possesses what the other one lacks. In the one hand the corporate is in need of novelties to be commercialized and has financial capabilities to sustain innovation (as well as potential failures). On the contrary, innovative startups are highly skilled on specific technological components, but are in lack of financial resources and managerial competences to bring their solutions to the final users.

Anyway, this kind of partnership is strongly asymmetric and, consequently, the two organizations incur in varied obstacles threatening the success. The typical problems are related to cultural diversities, as the startup has an intrinsic flexibility and risk propensity, while the corporate deals with rigidity and preoccupies of anything is novel; but also communication and complexity issues in managing the relationship arise when such two different environments try to interface to each other (Oughton et al., 2013).

This work tried to take into consideration how innovation can be pursued when this asymmetry between the two firms collaborating decreases, by substituting the large corporation with medium enterprise. Very few studies dealt with this topic so far. Through the analysis of the collaboration case between Bedeschi and Airlapp, we were able to reveal the relevance of this kind of innovation in an optic of growth, for both the internalization and expansion process aimed by the medium enterprise and for the startup potentiality to gain visibility and new commissions from prospects.

For all the phases of the collaboration (i.e. partner selection, agreement definition, solution development and implementation, conclusion of the project) we can try to extract insight about which determinants made the collaboration resulting into a success.

The activating factor making the collaboration to start is a problem that the middle enterprise had, related to the impossibility to show in an effective way the machineries and plants they manufacture, due to their great dimensions. Therefore, the origin is caused by an external need that the firm alone was not able to satisfy (Mercandetti et al., 2017), confirming the hypothesis that SMEs look for external partners in the moment in which external requests push the firm beyond its boundaries, seeking for external competences able to fulfill their deficiencies.

The partner selection is one of the crucial phases. Companies should be wise in the selection of the right collaborator (Franco, 2003), to strengthen their core technology and to develop complementary assets allowing to better access the market. The point of connection binding the two organizations can be attributed to the past acquaintance between startup CEO and Bedeschi managers (Weiblen and Chesbrough, 2015). As Usman and Vanhaverbeke (2016) affirmed, if a startup entrepreneur or manager in the past had dealt with a structured reality, the probabilities to engage in a collaboration and to achieve synergies are greater, since he/she better knows how a large company is organized and the mechanisms governing it, but also he can better comprehend which are the goals that a large company aim to accomplish. In this perspective, startup CEO has been a crucial role for establishing the beginning of the collaboration and negotiation.

For what regards the settlement of agreement, it has been fundamental that the two organizations did not focus mainly on monetary aspects, since it results only in a loss of energy (Oughton et al., 2013). Indeed, as remarked by the IT manager, the deal between the two actors only lasted few minutes, and the largest part of attention has been dedicated to the requirements and the objectives definition for value creation.

Once the agreement has been settled, the startup has been engaged in a requirement analysis, to better understand which characteristics and performance the final solution needed to provide. In this phase the startup acted as an internal technical office, studying the middle enterprise world to perfectly fit the software with the machines reproduced. The

low level of initial specification allowed to use the knowledge on software to really understand the partner necessities and even to prevent possible future hurdles. The high level of independency for the startups permitted them to bring out the best without undermining their potential with strict requirements. Furthermore, a continuous interaction between the two enterprises has been needed to successfully implement the Agile approach, and of course proximity has strongly favored this aspect. To this end, it has been fundamental to maintain for all the duration of the partnership a unique point of connection enabling to receive faster feedbacks on the work done and to easily carry out pivoting phases.

Another important key enabling a continuous and effective dialogue, has been surely the settlement of a more personal relationship between the actors involved and the high empathy level created during the whole collaboration. Condition that can be reached when complete trust comes into play; when also small problems are shown to the counterpart and they are mitigated together. From the interview emerged also that to reach this condition of trust and synergies, it is needed a more personal and tacit component able to create chemistry and affinity among people.

These components are very important also when the collaboration reaches the end of its scope. In fact, if the first interaction between firms has been a success and people maintained some connections going a bit beyond the simple business relationship, it is more likely that also in the future other innovation projects are brought forward; or even a simpler and informal sponsorship and requests for advice.

6.2.1 Bedeschi Key Factors

Bedeschi demonstrated that also medium-sized enterprises can exploit technological innovativeness and flexibility of startups to create a new solution, in a market in which the digital revolution has not already entered with pervasiveness. This case of collaboration shows that, even in a market of heavy industry as mining equipment and harbour cranes, the value proposition and the full package of offering can be potentially integrated and finalized thanks to digital solutions. Digital artefacts give the opportunity to improve the performances of the core products or to push toward a servitization of the offering. This collaboration case is an example of this servitization trend, enhancing the communicating

capabilities of the middle enterprise and permitting customers to live a new experience through Virtual Reality.

It has been shown that a medium-sized enterprise collaborating with an innovative startup can offset the limitations which large firms are very frequently exposed to. First of all, notwithstanding Bedeschi dimension counting almost 350 employees operating worldwide, its organizational chart is composed by very few lines as highlighted by IT manager during the interview. This factor permits to achieve a very quick decisional process, strongly fostered by the CEO culture of promptness to welcome and take into consideration anything is innovative.

This component of low rigidity also favoured an easier communication between the right agents. Many times, when startups are engaged by a corporate, the interface is managed by actors that are not directly responsible for taking final decisions (Oughton et al., 2013). Therefore, startups have often difficulties in understanding the different roles that must be captivated in large companies to define objectives and validate achievements. For sure, these ambiguities entail delays in the communication and discourage startups innovative propulsion.

Bedeschi maintained its IT manager as unique responsible of connection and communication with Airlapp. He acted as an interface between Bedeschi management and Airlapp staff. The exclusivity of point of contact allowed very fast alignment, update and problem reports; to let startup learn from feedbacks and apply changes in the next phase of development.

The other great merit of Bedeschi has been to avoid abusing of their imbalanced power against Airlapp and act in opportunistic way. Indeed, their position of authority might have been exploited to gain a very big advantage from the value offered by Airlapp, without giving back any complementary compensation over the mere monetary one. Instead, Bedeschi took care of this aspect, by sponsoring and largely thank the startup for their behaviour, by actively promoting and giving them visibility with its suppliers and other collaborators, or for example participating to events like the SMAU conference to testify the successful outcome of the partnering. This is the real benefit that startups should aim to obtain from these kinds of collaboration, that is to increase their reputation and

consideration in the market for scaling faster, by enlarging network of potential collaborators and clients.

6.2.2 Airlapp Key Factors

Bedeschi IT manager emphasized many times about the brilliant attitude of the innovative startup, that brought the collaboration to be a remarkable accomplishment. Airlapp has been able to deeply understand which was the necessity for Bedeschi, even considering that many components have not explicitly specified in the requirement definition phase. Airlapp developed the full solution internally and in complete freedom, since Bedeschi did not pose strong restraints. This ingredient could have revealed either a success or a failure factor. The high level of software skills allowed Airlapp to manage such a big element of uncertainty; a lack of specification completeness could have brought troubles in the solution quality. Instead, they exploit this freedom to leverage solely in their high level of software competences and create the most suited solution; largely overcoming the middle enterprise expectations, by providing supplementary components that reduced the risk of complaint and possible problems during the event at trade shows.

6.2.3 Final remarks

As already mentioned, this collaboration case started when Bedeschi discovered the need to find a better way to communicate their machineries and plants to customers. Nowadays, SMEs cannot be engaged in collaboration only when an external factor explicitly arises, otherwise the level of collaboration between SMEs and innovative startups will be always sub-optimal. Moreover, there is no business which can disregard digital technologies, and SMEs have no longer the chance to rely just on traditional businesses if they want to survive and to compete on global markets. To be able to manage and stimulate digital innovation is a challenge that is becoming always more important. Therefore, it is not anymore sufficient to open up firms' boundaries to engage in short-term collaborations or simple supplier/customer relationships, but organizations have to develop an internal culture of change to foster continuous innovation, also in small and medium-sized enterprises.

For this reason it is needed to create internal roles, not necessarily with technical competences to physically develop new solutions, but able to stimulate entrepreneurial

initiatives inside the organization itself. In this context, key roles are performed by managers of the different functions fostering innovation along the whole company; but eventually, these are not sufficient if it is not present the figure of the entrepreneur, who is passionate on what is innovative and is able to transmit this enthusiasm to all the other members of the organization. Only in the moment in which this internal culture is created, then it will be possible to collaborate with other companies and startups in a long-term and valuable relationship.

CHAPTER 7: CONCLUSION

The different analysis conducted in the thesis set the stage for advancing the understanding of the role that SMEs have in the Italian EE. To this aim, both qualitative and quantitative studies have been accomplished. The empirical analysis provides descriptive evidence about the relation that SMEs have with innovative startups inside IIDs, where SMEs tend to agglomerate. We discovered that there is relevance about innovative startup presence inside and closed to Industrial Districts, this implicitly shows that SMEs located in these areas influence new venture formation and growth.

The analysis on industry relatedness instead did not show explicit connection with entrepreneurial initiatives, whereas it is suggested that servitization of traditional manufacturing small and medium-sized enterprises can be linked to this concentration of innovative startups.

Moreover, the successful study case proposed, reveals the great opportunities that the collaboration between a traditional SME and an innovative startup can offer. This relation is under explored and therefore we tried to stimulate novel directions for academic research on these issues. The collaboration case analyzed proposes interesting insights about the reason why SMEs should seek for a startup as a partner and what positive impact such a collaboration can generate for both the organizations. Eventually the key factors enabling the collaboration to succeed are deducted.

7.1 Limitations

We recognize that this study is not free of limitations. First of all, our empirical analysis outcome is strongly dependent from the ATECO classification of economic activities, which presents well known weaknesses. One of these refers to the fact that the code is attributed in the moment of the constitution of the enterprise; and seldom it is adjusted over time, therefore scarcely identifies the real companies' activity. Moreover, it has been established in 2007, it is quite obvious that the digital and servitization advent brings many

new activities and businesses, that are not well represented in this out-of-date categorization.

The other limit is related to the low capability to generalize the insights deriving from the single case that the thesis proposes. In fact, the motivation behind the success could not be valid in other contexts in which startups and SMEs collaborate. There is the possibility that the considerations made, are attributable just to a restrict set of conditions, as SME dimension (in our case a medium enterprise with international presence and an already structured organization), industries of application (software development for the startup and manufacturing of machines for the SME) and the district or local area in which the organizations are engaged. The risk is that this type of collaboration could result in an isolated and not easily replicable case.

7.2 Future Directions

There are several future directions that can be explored in order to advance knowledge on the impact that SMEs have on new venture creation and growth. To date, some valuable studies deal with collaboration among SMEs, but without making distinctions with new entrepreneurial ventures. Furthermore, it is fundamental that new researches take into account the different perspective of SMEs and innovative startups.

First of all, as already mentioned, ATECO codes present limitations in categorizing innovative startups by industry. Future research should try to overcome this issue and highlight new evidences on industry relatedness, maybe through more focused lens on that districts showing high propensity for new venture creation. In fact, there is the necessity to create shared knowledge about the impact that industry relatedness have on new venture creation and collaboration between SMEs and innovative startups.

In this study, the entrepreneurial ecosystem has been studied just in term of total number of innovative startups born and located inside a territory and their connection with SMEs in IIDs. But a mature ecosystem needs to be analyzed also from a more qualitative point of view, as through discussing where and how many innovative startups are well performing, in terms of funds received, revenues and job creation by example.

Eventually, our research proposes just one study case, future research could try to find evidences in other successful case of collaboration between medium companies born in the first wave of entrepreneurship and innovative startups. Then, beside successful case history, also worst case and failure case should be investigated to understand which practices do not work in a collaboration between SMEs and startups and if they are complementary to the key factors which have been discovered in our investigation. Specifically, there is lot of uncovered space for quantitative analysis on larger scale samples, dealing with the various forms of proximity.

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