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Small-medium enterprises and innovative startups in entrepreneurial ecosystems: exploring an under-remarked relation

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Abstract

To date, contributions in the field of entrepreneurial ecosystems have mainly focused on definitions, actors, key attributes, consequences on startups' creation and growth, while conceding less space to key relations among actors. This study contributes to filling this gap by exploring the relation in entrepreneurial ecosystems between small-medium enterprises and a relevant class of startups: innovative startups. We take stock of extant knowledge to discuss the challenges and benefits of this relation. Then, we document that innovative startups tend to locate within Italian industrial districts, a peculiar case of entrepreneurial ecosystems where Italian small-medium enterprises tend to agglomerate, despite there is no evidence that they operate in the same industry of specialization of the Italian industrial districts. We interpret these results as a possible indication that innovative startups value the relation with small-medium enterprises. We provide an original review and illustrative evidence on small-medium enterprises and startups relations as few studies have done so far. Finally, the study presents a research agenda for stimulating novel directions for academic research and practice-oriented conversations on the role of small-medium enterprises and innovative startups in entrepreneurial ecosystems. We deem this is a relevant topic, given the importance of these relations, especially within entrepreneurial ecosystems located in countries where small-medium enterprises (often operating in traditional industries) are the main engine of local and regional development.

Keywords Entrepreneurship · Small-medium enterprises · Startups · Entrepreneurial ecosystem

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Introduction

Scholars define entrepreneurial ecosystems (hereafter: EEs) as "sets of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory" (Stam 2015, p. 5). The concept roots in the regional development and strategy literature (Yun et al. 2017; Erina et al. 2017) and emphasizes that entrepreneurship happens in a community of individuals, organizations, and regulatory bodies rooted in a territory (Freeman and Audia 2006; Isenberg 2010; Malecki 2011; Acs et al. 2017; Kuratko et al. 2017). Several scholars conceive EEs as complex and "evolving" dynamic systems (Acs et al. 2014; Isenberg 2010; Spigel 2017; Dubina et al. 2017; Cavallo et al. 2019a). Along this line of reasoning, Neumeyer et al. (2017) examine EEs as complex social organizations employing social network data analysis; other researchers introduce system dynamics and simulation methodologies in EE research (Yearworth 2010; Yun et al. 2017). Although we do not want to deny the value of these efforts, we recognize that most of the literature has seriously questioned the feasibility of modeling a complex and dynamic system *as a whole* (Pruyt 2013; Harrison et al. 2007). As suggested by Forrester (2007) - the father of complex modeling - to gain an understanding of complex systems, we should first focus on their smaller parts and key and context-specific relationships (Sterman 2000; Ghaffarzadegan et al. 2011).

Expanding on this argument, we contend that we can foster our understanding of *why and how* new ventures are created and growth in EEs by going deeper into the most important relations linking their actors (see, e.g., Spigel 2017 for a similar argument). The growing strand of the research on EEs, which addresses this topic, has, to date, focused on the relations linking new ventures to incubators, venture capitalists (VCs), local universities, and large corporations. Extant contributions recognize the paramount importance of incubators for fostering local entrepreneurship (see, for instance, Campbell and Allen 1987; Hackett and Dilts 2004); likewise, there is consensus on universities' key role in EEs. Specifically, universities are viewed as sources of entrepreneurial opportunities and technical solutions, stimulating new ventures' creation and growth (Acs et al. 2009; Bonaccorsi et al. 2013; Ghio et al. 2016). VCs are regarded as key actors in EEs (e.g., Cumming et al. 2017). This holds especially true when referring to innovative entrepreneurship as these specialized investors can fill the financial and knowledge gaps that innovative startups experience in their early development stages (Gompers and Lerner 2001). Finally, several studies point to large corporations' leading role in supporting new ventures in EEs (e.g., Neck et al. 2004; Bhawe and Zahra 2017).

Conversely, the relations linking new ventures, in general, and innovative startups, in particular, to Small-Medium Enterprises (SMEs) have gone to date under-remarked. We consider this an important gap in the literature on EEs. Indeed, evidence exists that many EEs, where the VC market is under-developed, and there are few large corporations, are rich in SMEs (often operating in traditional industries), which are deeply rooted in the territory. It is reasonable to imagine that, in these contexts, SMEs can play a leading role in stimulating the creation and growth of startups - even of the innovative ones – also by generating synergies with incubators and universities.

This study attempts to fill this gap. First, we take stock of extant knowledge to discuss why SMEs' relations and innovative startups can be key in EEs. In particular,

we explain that, despite their differences and their common liability of smallness (Aldrich and Auster 1986), SMEs and innovative startups can leverage their complementary needs and resources to establish win-win relations.

Then, we provide descriptive evidence illuminating this relation in the relevant context of the Italian Industrial Districts (IIDs), a peculiar case of EEs, where Italian SMEs, operating in the same industry, tend to agglomerate (Becattini 2004; Brown and Mason 2017). In particular, we move from the premise that geographical proximity enables relations among organizations (e.g., Rallet and Torre 1999; Knoben and Oerlemans 2006), and analyze whether and how innovative startups *agglomerate* within IIDs. If present, such agglomerations (indirectly) indicate that innovative startups envisage benefits from locating in IIDs and establishing relations with the SMEs. Moreover, we recognize that other forms of proximity, besides the geographical one, can favor the formation and the proficiency of these relations (Boschma 2005). In particular, the literature has explored the importance of *cognitive proximity*, which refers to the extent to which organizations share the same reference and knowledge space (op. cit., p. 63). Accordingly, to gain further insights into the relation mentioned above, we consider *whether and how* the industries in which innovative startups operate relate to the industry of specialization of the IID, i.e., *industry relatedness* (see, e.g., Frenken et al. 2007). As captured by industry relatedness, cognitive proximity points to the crucial interplay between Jacobean and Marshallian economies (Boschma 2005). Indeed, whether, on the one side, it eases the transfer of knowledge and resources from SMEs and innovative startups, on the other side, it may generate redundancies and hamper creative and innovation processes.

Our descriptive evidence is based on the 9931 Italian innovative startups in the registry created by the Decree-Law 179/12 and 141 IIDs. Our findings suggest that innovative startups tend to agglomerate in IIDs. Conversely, no evidence shows industry relatedness between innovative startups and industrial districts. We discuss the implications of this evidence. Finally, we propose a possible research agenda on SMEs and startups' relations to stimulate novel directions for academic research and practice-oriented conversations on EEs.

The remainder of the paper proceeds as follows. Second section discusses the relationship between SMEs and innovative startups in EEs. Third section illustrates data and the methodology of our descriptive analysis. Fourth section presents the results. Fifth section discusses the results and present the aforementioned research agenda, while sixth section concludes the study.

SMEs and innovative startups in EEs: A critical perspective

SMEs and innovative startups share the common feature of being both small organizations typically having informal structures and ties and, thus, being inherently flexible (Terziovski 2010; Paniccia 1998). Thus, it is not rare that scholars make no explicit distinction between them (e.g., Bianchi et al. 2010). However, SMEs and innovative startups have differences, which scholars should not under-remark by including them in a unique category.

First, these firms originate from two distinct "waves of entrepreneurship," which, despite taking place at different periods in diverse countries, have had a crucial impact on today's businesses. The first wave, which was guided by Taylorism and (later) by the Lean philosophy (Womack and Jones 1997), produced those low and medium-tech firms, which currently mainly operate in the manufacturing industries, and, as they grew and consolidated at different scale and paces, took the broad configurations of large corporations or SMEs. The second wave (also called "productive" or innovative entrepreneurship, Stam 2015) was triggered by new technologies (Longhi and Keeble 2000) and by the Internet and mostly originated high-tech and internet-based firms, including *innovative startups*. After having gained momentum in the US at the end of the '90s, this second wave underwent a stop in consequence of the notorious "internet bubble", whose effects on the formation of *innovative startups* were even more severe in countries commonly recognized as risk-averse, such as Italy and European countries, as compared to the US. However, today, innovative startups are seemingly booming almost everywhere globally, being the target of numerous supporting policy initiatives.[1]

Second, SMEs and innovative startups differ in their market orientation and their attitudes to growth. Many SMEs are born local and small and aim to remain local and small (Camagni and Capello 1988), also because their owners perceive them as an extension of their identity and their family needs[2] (Carland et al. 1984; Friar and Meyer 2003). Conversely, innovative startups aim to grow fast and scale globally (Stam 2015; Spigel 2017). Third, and partially connected to the previous point, SMEs and innovative startups differ in innovation orientation. Carland and colleagues (Carland et al. 1984) define a small business venture as an independently owned firm, not dominant in its industry, which typically does not engage in innovation. Conversely, the authors refer to innovative startups as "entrepreneurial ventures pursuing profitability and growth through innovation practices". Other prominent scholars support this view (e.g., Zott and Amit 2007; Bhide 2000).

The aforementioned differences might conclude that SMEs and innovative startups are likely to be disconnected actors within EEs. Basing on the literature, we challenge this view. We argue that, despite their inherent diversity, these firms can instead establish proficient relations in terms of privileged partnerships and/or buyer-supplier links. Indeed, as we explain in the following, specific features of SMEs - compared to large firms (e.g., Zajac and Olsen 1993; Colombo 2003) - favor their relations with innovative startups. Moreover, SMEs and innovative startups have complementarities in needs and resources, which speak in favor of the success of these relations (Bleeke and Ernst 1991; Harrigan 1985) in that complementarities generate potential synergies (Gnyawali and Park 2009) and mutual learning indeed, while reducing the risk of opportunistic behaviors (Sarkar et al. 2001).

Several factors favor the establishment of relations between SMEs and innovative startups in EEs. First, these firms have diverse goals; while SMEs focus on niche and local markets, innovative startups aim to innovate and scale globally. This diversity in

[1] For instance, the France government launched a 10 billion € investment fund for innovative startups, whereas, in Italy, more than 10,000 innovative startups are registered at the Italian Chamber of Commerce.

[2] In many cases, SMEs are family-owned (Sciascia et al. 2015)

goals suggests that these firms neither feel threatened by each other's nor experience distrust, thus being free from the most common burden in partnership formation (Doz 1987). Second, as aforementioned, both SMEs and innovative startups have informal and flexible structures (Hudson et al. 2001; Qian and Li 2003; Terziovski 2010), which scholars recognize as the main source of their competitive advantage (Fiegenbaum and Karnani 1991; Qian and Li 2003). This similarity in organization favors the establishment of relations, in a context where collaborations with large firms are instead hampered by their rigid and formal organization (see Volberda 1999, for a discussion of how rigid and formal procurement policies prevent large corporations from establishing supplier relations). Third, while managers of large corporations are usually not inclined to take a risk (Amihud and Lev 1981), by choosing as partner a startups without a proven history or track record, SMEs' owners tend to make decisions based on their perceptions and may trust innovative startups as partners.

As to complementarities between SMEs and innovative startups, it is worth pointing out some needs and strengths that both firms have on their side and can make their relations in EEs highly valuable. SMEs are specialized in niche markets and are deeply rooted in the geographical areas they operate, thus having in-depth context-specific knowledge and strong ties with other actors of the EEs to which they belong. By establishing relations with innovative startups, SMEs, which likely suffer from liability of newness (Bhide 2000), can leverage this knowledge and this (highly-localized) social capital. Furthermore, SMEs can also support innovative startups in their internationalization (Lu and Beamish 2001). Despite the local orientation of many of them, some SMEs engage in significant export activities (Wilkinson and Brouthers 2006) and know (and sometimes own) international distribution channels (Knight 2001). Partnering with SMEs for commercializing their products abroad can be a valuable option for innovative startups, which are moving their first steps to global markets. In turn, SMEs face tremendous challenges in pursuing innovation (e.g., BarNir and Smith 2002; Gnyawali and Park 2009), exploiting digital technologies, and moving from a product to a service orientation. In this framework, innovative startups can support SMEs in innovation and their (digital) servitization process - both widely recognized as crucial steps for SMEs' competitiveness in a global market (Ayala et al. 2017).

This holds particularly true in the light of the fact that SMEs - and especially those operating in the manufacturing sector - are currently facing increased competition from low-cost manufacturers in China or India (Bessant and Tidd 2007; Terziovski 2010). This is pushing them to search for novel ways to be competitive: forming collaborations with innovative startups can serve this purpose in that these innovative partners can help SMEs to close their gap in creativity and innovation. Besides establish collaborations, innovative startups also have the option of forming supplier relations with SMEs by selling them their innovative products and services, thus enlarging their customer base and increasing their revenues. Having SMEs as a source of revenues can be crucial for the self-sustain growth of innovative startups in EEs in which the presence of SMEs is massive, while the VC market is underdeveloped.

Once discussed the relationship between SMEs and innovative startups in EEs, the provision of empirical evidence could help to grasp further insights. We envisage three main options for data collection: using case studies, taking surveys on SMEs and innovative startups, or basing on secondary sources. Case studies allow gaining in-depth knowledge of phenomena under-investigation, but this knowledge is hardly

generalizable (Yin 2011). Surveys are better in terms of generalizability, but they are prone to biases and low response rates, especially in SMEs and innovative startups whose owners managers often face severe time pressure (Boeker and Karichalil 2002; Carree and Verheul 2012). Thus, given the exploratory nature of this study, we decided not to engage in collecting first-hand data and use secondary sources for offering initial evidence, which can also pave the way for tailored data collection.

Specifically, we focus on *Italian Industrial Districts*, which are specific and limited areas, where Italian SMEs from the "first wave", mainly operating in manufacturing industries, have typically agglomerated (Becattini 1989). IIDs are long-lasting and successful EEs that have experienced crises and transformations over time but are still an important engine for the Italian economy. Thus, we take them as a privileged context to obtain empirical evidence on SMEs' relationships with innovative startups. In so doing, we also advance the knowledge of IIDs. Indeed, these peculiar EEs have attracted massive scholarly attention (e.g., Murray 1987; Becattini 1989; Camagni and Capello 1988; Belussi 1988; Pyke et al. 1990; Pyke and Sengenberger 1992), but, we need to learn more on the role that innovative startups from the second wave play for SMEs and their industrial dynamics.

Our empirical analysis takes the step from the literature on proximity. It is well-known that co-location and geographical proximity,[3] are crucial antecedents of the formation and success of inter-firm relations (Boschma 2005; Katz 1999; Fritsch and Schilder 2008; Hillberry and Hummels 2003; Ellwanger and Boschma 2015). Thus, by observing whether innovative startups localize with or in the proximity of IIDs, where SMEs are main actors, we (indirectly) gain insights on the importance of the relations between these two types of firms in EEs and on the probability of their formation.

Moreover, the proximity literature claims that other forms of proximity may rule and foster relations among firms (e.g., Rallet and Torre 1999; Boschma 2005; Knoben and Oerlemans 2006). In particular, scholars have recognized the crucial importance of *cognitive proximity*, which "it is meant that people sharing the same knowledge base and expertise may learn from each other" (Boschma 2005, pp. 63). There is consensus that cognitive proximity is high for firms operating in the same or neighboring industries and low for those operating in distant industries. In other words, cognitive proximity closely relates to *industry relatedness* (see, e.g., Frenken et al. 2007). High cognitive proximity (high industry relatedness) gives firms common and fertile ground for their interactions, with limited communication barriers and uncertainty (Neffke et al. 2011) and many possibilities of mutual learning (Frenken et al. 2007). Conversely, low cognitive proximity (low industry relatedness) can foster complementarities among firms. For instance, scholars have noted that alliances among firms with different industry specializations can experience superior performance (Glaister 1996).

Following this line of reasoning, we argue that further insights on relations between innovative startups and SMEs in EEs can come from empirical evidence on the relatedness of the industry of operation of innovative startups and the industry of specialization of the IID, in which they are located, which we assume as a reasonable proxy of the industry of operation of SMEs operating in the IIDs. High industry

[3] , commonly defined as the spatial distance between actors, both in absolute and relative terms (Boschma 2004; Gilly and Torre 2000)

relatedness points to high cognitive proximity between SMEs in the IID and innovative startups, which can leverage it to establish proficient partnerships to exchange knowledge and engage in mutual learning. In turn, low industry relatedness points to low cognitive proximity between the two types of firms, which may encounter difficulties forming a relation, but can benefit from synergies and complementarities.

Data and methodology

Our analyses base on data on innovative startups and IIDs in the Italian context, which we deem to be highly salient for this study. Italy is currently witnessing a new big wave of innovative entrepreneurship, which has also captured policymakers' major attention. In the country, the VC market is underdeveloped, and there are few large firms; it is thus natural to expect that relations between innovative startups and SMEs play a significant role in the development of EEs. In turn, IIDs are typically populated by SMEs and represent a success story of entrepreneurship, which relations between SMEs and innovative startups can contribute to rejuvenating.

The Italian government, through the Decree-Law 221/2012 ('Italian Start-up Act'), recognized the crucial role of entrepreneurship and innovation as drivers of sustainable economic growth: policies were issued to support innovative entrepreneurship, and a special section of the firms' Register was created for innovative startups, i.e., the Innovative Startups' Register. The Law Decree labels as an innovative startup, eligible for the entry in this register 'a firm, not listed and subject to Italian tax law, which has a turnover of fewer than 5 million euros, has been operational for more than 48 months, is owned directly for at least 51% by physical subjects, and, more importantly, has the social aim of developing innovative products or services, with a high technological content' (Colombelli, 2016, p.386).[4] Since startups may access several benefits through the enrolment in the Innovative Startups' Register, this is a representative and valuable source of information for the overall population of innovative Italian startups (Colombelli, 2016; Minola et al. 2019).

In this study, we use data on 9931 innovative startups established between 2011 and 2019[5] and classified by industry through ATECO[6] 2007. Tables 1 and 2 illustrate the sample's breakdown according to the registration year at the Chamber of Commerce and Industry specialization by two digits ATECO codes.

Data on 141 Industrial Districts were collected from the Italian Institute of Statistics (ISTAT).[7] Each IID has associated with a set of ATECO 2007 codes depending on the SMEs' industry populating the IIDs. Table 3 illustrates the industry specialization by two digits of ATECO codes. Also, in Table 4, we show innovative startups and IID geographical distribution.

[4] For a more detailed description of the new Italian legislation on 'innovative startups', see also Calcagnini et al. (2016).

[5] , updated to 03/04/2019

[6] Italian version of the European nomenclature, NACE Rev. 2, published in the Official Journal of 20 December 2006 (Regulation (EC) no 1893/2006 of the European Parliament and of the Council of 20 December 2006).

[7] https://www.istat.it/

Table 1 Distribution of innovative startups by year 2011–2019

Year	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
Total	9931	100

Considering the study's purpose, we focused on localization, the industry of operation of innovative startups, and the industry of specialization of IIDs.

Assessing geo-proximity

For assessing co-location and geographical proximity between innovative startups and IIDs, we leverage on GIS techniques. Specifically, we computed the distance in kilometers (Ellwanger and Boschma 2015) and traveled time in hours from innovative startups and IIDs. To this end, we determined the geographical coordinates of innovative startups basing on their address and the geographical coordinates of the center of the area, which IIDs cover. Using this information, we calculated distance in kilometers using the great distance formula (Pearson 2017). Moreover, we also calculated the shortest traveling time by car (Fritsch and Schilder 2006) using *Google.maps*. After measuring distance, for each innovative startup, we could identify whether it collocates within an IID and, if it does not, what is its closest IIDs.

To corroborate the results obtained with the GIS technique, further analysis has been conducted based on Labour Market Areas (LMAs). LMAs are functional regions (Brown and Holmes 1971), capturing the extent of commuting fields of residents and firms' catchment areas from a particular geographical area (Casado-Díaz et al. 2017; Casado-Díaz 2000). Scholars widely use them as a valid unit of analysis since they provide a more appropriate territorial area capturing the interplay between labor demand and supply than administrative geographical units (Goodman 1970; Smart 1974; Casado-Díaz et al. 2017). Administrative units, indeed, are static and typically reflect historical and political events while failing to capture economic activities and clustering (de Dominicis et al. 2007).

LMAs are particularly suitable for our study since their boundaries are used to define Italian Industrial Districts (ISTAT 2006; Mameli et al. 2012; Sforzi 1989). LMAs (also known as Local Labour Systems in Italy), in practice, are an aggregation of two or more contiguous municipalities identified by the concentration of residential activities (such as expenses for production and distribution) as well as of those social relations that are created within it (de Dominicis et al. 2007; Calafati and Veneri 2013). As a result, LMAs are distinguished in "district LMAs" (D_LMAs) and "not district LMAs" (NO-D_LMAs) by the Italian National Statistical Office (ISTAT). Additionally, we

Table 2 Industry 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		52	0.52

Table 2 (continued)

2 Digits	Sector	Activity	No.	%
		C 14 PACKAGING OF CLOTHING ITEMS; PACKAGING OF LEATHER AND FUR COAT ITEMS		
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
NC		N.S.	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		11	0.11

Table 2 (continued)

2 Digits	Sector	Activity	No.	%
		G 45 WHOLESALE AND RETAIL TRADE AND REPAIR OF MOTOR VEHICLES AND MOTORCYCLES		
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

Table 2 (continued)

2 Digits	Sector	Activity	No.	%
37	SERVICES	E 37 MANAGEMENT OF SEWAGE NETWORK	1	0.01
Total			9931	100.00

created a variable named "extended district LMAs-first crown" (DE1_LMAs), which represents an area that extends "district LMAs" to municipalities directly neighboring/

Table 3 IIDs Industry Specialization

2 Digits	Sector	No.	%
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

Table 4 Geographical distribution of IID and innovative startups

Geographical Area	No. IID	% IID	No. startups	% startups
North-West	37	26.2	3196	32.2
North-East	45	31.9	2224	22.4
Centre	38	27.0	2078	20.9
South	17	12.1	1790	18.0
Islands	4	2.8	643	6.5
Total	141	100	9931	100

contiguous (first crown). Specifically, we measured the distribution of innovative startups in three types of LMAs aforementioned (D_LMAs; NO-D_LMAs; DE1_LMAs). Our analysis is based on the 2011 classification of LMAs (ISTAT 2015).

Assessing industry relatedness

We then measured whether there is industry relatedness between innovative startups and the IIDs they collocate or are close to. Industry relatedness is commonly measured by indicating whether two activity codes belong to the same level within an industrial classification system (e.g., Porrini 2004; Frenken et al. 2007; Haleblian and Finkelstein 1999). Some scholars also use other specific measures for relatedness, such as product-relatedness (see, for instance, Neffke et al. 2011) or technological-relatedness (e.g., Ahuja and Katila 2001; Cassiman et al. 2005; Steensma et al. 2012). Since the latter is more appropriate for large firms than small ones (Lanjouw and Schankerman 2004; Aghasi et al. 2017) (as in our sample) and no data is available on products, we measure industry relatedness based on ATECO codes. Despite its weaknesses (e.g., Markides and Williamson 1996), ATECO classification is the only consistently available information for our sample. ATECO codes discriminate against the core business activities of a firm to the division (2-digit), group (3-digit), class (4-digit), category (5-digit), and subcategory (6-digit) level. Since many firms in our sample do not present data in terms of group, class, category, and subcategory, we focused on divisions. Thus, we operationalized industry relatedness with mutually exclusive binary variables, as a widely accepted and used measure in the literature (e.g., Ellwanger and Boschma 2015). Specifically, we measure industry relatedness between the innovative startups and SMEs located in a district LMA based on the following variables: INTRA_Section, equal to 1 if innovative startups share the same ATECO section (the highest form of categorization, represented by a letter) with at least one of the IIDs, zero otherwise; INTRA_Division, equal to 1 if the innovative startups shares identical first two digits of its ATECO code (division) with at least one of the IID's codes, zero otherwise; INTRA_Group, equal to 1 if the innovative startups share identical first three digits of its ATECO code with at least one of the IID's codes, zero otherwise; INTRA_Class, equal to 1 if the innovative startups share identical first four digits of its ATECO code with at least one of the IID's codes, zero otherwise.

Empirical evidence

Tables 5 and 6 illustrate the distribution of innovative startups in terms of their co-location and proximity to IIDs, both in kilometers and travel time (hours). According to ISTAT, the average geographical area occupied by an IID in Italy is 400 km^2. Methodologically, we localize each IID with the geographical coordinates of the center of the geographical area it covers. It is reasonable to assume that - within 10 km distance from an IID - the startup is located in an IID's geographical area. Results in Table 5 illustrate that this is the case for 18% of startups' total sample.

Furthermore, we find that 73% of the total sample of innovative startups is located within 30 km from the closest IID. Thus, we consider that - within 30 km distance - two entities can be accounted for in geographical proximity. Similarly, while considering travel time, 89% of the innovative startups can reach the closest IIDs within 60 min at maximum (see Table 6).

A further analysis was conducted based on LMAs. Results in Table 7 show that 18.3% of innovative startups are located in "district LMAs" (DE1_LMAs). This percentage grows if we consider contiguous municipalities to 30.19% (in extended district LMAs-first crown: DE1_LMAs). These results further confirm that many innovative startups tend to locate in district areas or close by.

Furthermore, we measured industry relatedness between SMEs and innovative startups located in district LMAs. As shown in Table 8, results indicate that the industry relatedness between startups and SMEs is high (25%) at the Section level but decreases consistently while moving to a higher industry classification (i.e., Division, Group, and Class).

Discussion and future research directions

Scholars concur that to foster our understanding of *why and how* startups are created and grow in EEs, it is of paramount importance to understand the relations linking EEs' actors (Spigel 2017) and, in particular, to examine these relations in the case of startups. The growing strand of the research on EEs, which addresses this topic, has, to date, focused on the relationships linking startups to incubators (Campbell and Allen 1987; Hackett and Dilts 2004), venture capitalists (Gompers and Lerner 2001; Hall 2002), local universities (Acs et al. 2009; Bonaccorsi et al. 2013; Ghio et al. 2016; Secundo et al. 2020), and large corporations (Neck et al. 2004; Bhawe and Zahra 2017). However, we know much less on the relations between startups and SMEs, which are particularly important in EEs countries characterized by many SMEs, an underdeveloped VC market, and few large corporations. In this study, we aim to open a debate

Table 5 Distance between IID and Innovative startups

	<10 Km	10–30 Km	30–100 Km	100+ Km
Number of innovative start-ups	1788	5463	1786	894
Percentage	18%	55%	18%	9%

Number of Observations: 9931

Table 6 Travel time between Industrial Districts and Innovative startups

	<30 mins	30–60 min	60–120 min	120+ mins
Number of innovative start-ups	4296	3118	308	605
Percentage	52%	37%	4%	7%

Number of Observations: 9931

and provide further research directions on this theme by focusing particularly on relations between SMEs and innovative startups in IIDs. In so doing, we also adhere to the view that EEs are territory and context-specific (Acs et al. 2017; Anselin et al. 1997; Florida et al. 2017) and key relations in EEs should consider local and contextual dimensions.

In the theoretical part of the paper, we discuss the main features and differences characterizing SMEs and innovative startups, and explain why relations among them (in terms of partnerships or buyer-supplier links) are likely to form in EEs and can be mutually beneficial. Moreover, we provide evidence on the relevance of these relations. First, we show that innovative startups tend to localize in or in the proximity of IIDs, where many SMEs accumulate. Second, we find no strong evidence of industry proximity/relatedness between innovative startups and IID's SMEs.

In this study, we also started to search for a "signal" of a connection between SMEs and innovative startups. Specifically, we provide descriptive evidence on the geographical and industry proximity between SMEs and innovative startups. Our descriptive evidence suggests that innovative startups tend to agglomerate within or close by IIDs - typically populated by SMEs operating in the manufacturing sector. A large body of literature argues that effective collaboration may be favored by geographical proximity (e.g., Rallet and Torre 1999; Knoben and Oerlemans 2006). However, several other forms of proximity exist (Boschma 2005) that need further investigations, such as industry proximity. As regardsss, we find no compelling evidence on industry relatedness between innovative startups and IIDs. While adopting different theoretical lenses, scholars have long debated around industry relatedness as a factor fostering rather than depressing the potential advantages of collaborations between organizations. For instance, organizational learning theorists suggest that interactions among industry-related companies may favor the exploitation of synergies leading to better innovative and economic performance (Cohen and Levinthal 1990; Mowery et al. 1996).

Table 7 Distribution of innovative startups by LMAs

Variables	No. startups	% startups	Population 2016[millions]	% Population	Area (Km^2)	% Area
LMAs	9931	100.00	60,665,551	100.00	302,072.84	100.00
NO_D_LMAs	8114	81.70	47,168,200	77.75	241,705.60	80.02
D_LMAs	1817	18.30	13,497,350	22.25	60,367.24	19.98
DE1_LMAs	2998	30.19	21,505,318	35.45	111,138.54	36.79

Table 8 Industry Relatedness between IID and innovative startups

	No.	%
Intra Section	471	25.92
Intra Division	194	10.68
Intra Group	70	3.85
Intra Class	17	0.94
Total	1817	100

Conversely, some scholars argue that being too industry-related may reduce the learning opportunities and affect innovation performance (Sapienza et al. 2004; Ahuja and Katila 2001; Ghoshal 1987; Cloodt et al. 2006). Similarly, scholars following a Resource-Based-View perspective argue that resource relatedness may enhance collaborations among companies. Conversely, complementarities' economic theory informs about the benefits of resource complementarity in alliances and acquisitions (Harrison et al. 1991; Milgrom and Roberts 1995; Tanriverdi and Venkatraman 2005). We recognize that the first evidence we find deserves a deeper investigation that may confirm or not our results. As regards, ATECO codes present well-known limitations while categorizing innovative startups by industry. Future studies should try to overcome this issue. In the following, we sketch a possible research agenda around four suggested (though not limited) research directions.

1. *Qualitative and quantitative studies on SME and innovative startups partnerships*

To further this debate, we need both qualitative and quantitative studies. For instance, exploring cases of partnerships between SMEs and innovative startups may enhance our understanding of the mutual benefits they may exploit. Beside successful case history, also worst cases and failure cases should be investigated. Some studies even highlight those innovative startups are often "killers" of SMEs (Henrekson and Sanandaji 2014). As regard, studies are needed focusing on specific context and industry of reference in order to further our understanding of good, best, and bad practices. At the same time, SMEs and innovative startups may collaborate. As regards, several theoretical lenses and perspectives may come to aid and support future research, stemming, for instance, from strategy (e.g., strategic alliances, resource-based view) innovation (e.g., open innovation) and complex adaptive system literature (Roundy et al. 2018). Valuable studies deal with SMEs' collaboration. However, they partially neglect the fundamental distinction between SMEs and entrepreneurial ventures (Zott and Amit 2007). Thus, we believe there is room to advance the current body of research. Moreover, there is an emerging need to systematize literature on a common and shared perspective among scholars on industry relatedness positive or negative role in fostering collaborations between SMEs and innovative startups. Specifically, there is a need for quantitative analysis on larger scale samples dealing with proximity (Kuckertz 2019).

2. *Fostering (digital) servitization process*

Along debated in the literature, the "servitization process" involves many SMEs operating in manufacturing (e.g., Vandermerwe and Rada 1988; Baines et al. 2009)

and may also represent a promising avenue to further EE's research. SMEs typically are more product than service-oriented (Pacheco et al. 2019). However, today customers require additional services that may complete the product, expand its uses and scope (Sassanelli et al. 2019). Companies' emphasis is turning from "the sale of product" to the "sale of use", and from possessing to accessing (Baines et al. 2009). In other words, companies are selling the usage of a product rather than selling it. The *servitization process* may represent a specific collaboration project leading to mutual benefits for SMEs and innovative startups. To face new trends and threats and be sustainable, many companies are required to build additional services around a focal product (Coreynen et al. 2017). This process is not easy for "giant" companies and similarly for SMEs. Future research may investigate whether innovative startups may support IIDs' SMEs through their servitization process. Moreover, scholars demonstrating major attention on digital entrepreneurial ecosystems may find a great interest in investigating the role of the "digital servitization process" (Opresnik and Taisch 2015) as a factor enabling collaboration between SMEs and innovative startups and ultimately fostering the entrepreneurial ecosystem. Valuable contributions focus on how digital servitization is organized from the viewpoint of the focal actor (Sklyar et al. 2019; Tronvoll et al. 2020), while entrepreneurship research will probably benefit from an original and more collaborative perspective on servitization.

3. *Digitalization and business model innovation*

The role of digitalization is widely acknowledged as highly influencing EEs and the entrepreneurial dynamics within EEs (Autio et al. 2018). Scholars claim the need to focus more on the digital entrepreneurial ecosystem (Acs et al. 2014) and "productive entrepreneurship" (Stam 2015; Cavallo et al. 2019a; Baumol 2010). However, what if we underestimate the role of traditional and "less productive" entrepreneurship (SMEs) in fostering digital entrepreneurial ecosystems? Several economies worldwide are still largely based on SMEs' contributions (Man et al. 2002). Their need and known difficulties to innovate may, for instance, act as a trigger to stimulate an internal demand of digital and innovative services/products produced by innovative startups, as well as triggering a virtuous cycle of knowledge spillovers (Caiazza et al. 2019). As regardsss, the debate is still in its infant stage, urging for answers to pressing questions such as: *"How do innovative startups and SMEs engage and leverage on digital affordances?"; "What factors enable the digitalization of traditional SMEs?"; "How can SMEs stimulate the birth and the growth of innovative startups in a digital environment?"*

Furthermore, scholars just opened a new debate on how digitalization transformed the entrepreneurial process and outcomes (Nambisan et al. 2019), which may arguably be a key distinctive feature differentiating traditional SMEs and innovative startups. Debate on the digital-enabled entrepreneurial process includes the fundamental role of lean practices supporting the business model design and innovation, such as the lean startup approaches (Nambisan 2017; Shepherd and Gruber 2020), and related impact within the entrepreneurial ecosystem (Autio et al. 2018). Scholars focus on how such practices supported many young innovative startups in finding a proven business model through speeding and scaling tests and experiments on fundamental business assumptions (Ghezzi and Cavallo 2020). However, less attention was paid to how traditional SMEs can leverage lean

practices and learn from innovative startups. Thus, further studies analyzing SME and innovative startups should aim to specifically contribute to the emerging digital entrepreneurship research field (Nambisan 2017; Cavallo et al. 2019b).

4. *Governance, SMEs and innovative startups*

Recently emerged another hot topic in EE research that deserves great attention: how entrepreneurial dynamics can be governed (Colombo et al. 2017) and what are the key factor that may have a major role here: nobody - "invisible hand"? (Isenberg 2010), policymakers? (Stam 2015), universities? (Miller and Acs 2017) large corporations? (Bhawe and Zahra 2017), investors? (Colombo and Murtinu 2017), joint ventures (Audretsch and Link 2017); and in which phase of the EE evolutionary process? (Colombelli et al. 2017). Scholars are debating whether EEs are governed by "natural" and/or "artificial" mechanisms (Colombo et al. 2017; Kuckertz 2019). Arguably, a reasonable answer might be a "right middle" between heavy policy intervention and self-regulating mechanisms. Thus, arising a relevant research direction over the measures policymakers may introduce to make a direct impact on entrepreneurial dynamics, and how they can facilitate and foster "natural" and self-regulating mechanisms. In this study, we highlight that also SMEs may play a major role in EEs. Future research should focus not only on how SMEs may favor the birth and growth of innovative startups but also on their supportive role to other EEs' key players such as incubators, angels, VCs, etc. Besides, we argue that a promising research direction will investigate whether SMEs may replace some of the key players aforementioned and compensate for the absence of an active venture capital market. Here, qualitative and especially quantitative studies are required to foster our current knowledge of the topic, which is of interest to policymakers.

Conclusion

Concluding, this study sets the stage for advancing our understanding of SMEs' role in EEs. As regard, we focus on the under-explored relation between SMEs and innovative startups to stimulate novel directions for academic research and practice-oriented conversations on EEs and, more generally, on regional development. We provide descriptive evidence of this relation in the context of Industrial Districts (IIDs), a peculiar case of EEs, where Italian SMEs tend to agglomerate. We systematize the (limited) available knowledge on the relation between SMEs and startups in EEs. We argue that this relation may result crucial, especially for EEs located in countries characterized by an underdeveloped VC market, a limited number of large corporations, and SMEs, often operating in traditional industries, are the main engine of local and regional development. This may open to several practical implications for innovative entrepreneurs that can leverage SMEs' assets and resources and vice-versa. From a broader perspective, collaborations between SMEs and innovative startups should be encouraged and facilitated as presenting several complementary strengths. Policymakers, incubators, universities, and other actors providing support to startups should take this into account as pretty much in line with their mission to foster the entrepreneurial ecosystem.

The study had presented a possible agenda on the topics that may result in interest for both academics and practitioners. We believe that SMEs and innovative startups' relations deserve greater attention to the entrepreneurial ecosystem body of knowledge.

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