HOW START-UPS OVERCOME THEIR LIABILITIES. EMERGING TOPICS AND FUTURE RESEARCH PATHS

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Abstract

Start-ups play a crucial role in the innovation process; nevertheless literature on this theme is fragmented. This study aims to provide a better understanding of start-ups and innovation, and suggests future research paths. By means of a literature review, we selected and analyzed relevant papers identifying the main topics of this research stream. Start-ups face a liability of smallness and a liability of newness, thus they engage in relationships with a variety of partners to overcome these constraints. In this context start-ups can play the role of knowledge recipient or knowledge supplier, depending on the relationship type. Besides, the revised literature highlights the leading role of the innovation ecosystem for start-ups growth and success.
This work clarifies the role of start-ups in the innovation ecosystem, confirming the attitude of these young organizations towards openness. Furthermore it provides some insights for practice and several promising areas for future research.

Keywords: *Start-ups; Innovation; Ecosystem*
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1. Introduction

Innovation has always been a topic of great interest in managerial studies (Schumpeter, 1934; Teece et al., 1997). Since Schumpeter to nowadays, innovation is considered as the main mechanism for companies to grow and to create a sustainable competitive advantage. Therefore, firms are constantly searching for new ways to transform and advance their innovation strategies to generate and maintain superior firm performance.
At the same time, several economic and technological trends and changes occurred in the last decades (resources for innovation are becoming increasingly distributed and are changing more frequently, R&D costs are

accelerating while product life cycles are becoming shorter), weakened the traditional closed innovation model and called for an alternative and more open approach (Chesbrough, 2003; Dahlander and Gann, 2010). Such perspective implies the involvement of several actors (suppliers, customers, competitors, R&D labs, universities, public administrations, etc.), which can be considered valuable sources of knowledge as well as recipients. Thus external actors and organizations become partners in a cooperative, interactive and innovation-driven network (Arrigo, 2018). Scholars largely studied many of these relationships, characterized by the presence of a focal firm surrounded by partners as peripheral knots. Such studies sometimes integrated previous works and evolved in independent research streams such as: user innovation (von Hippel, 2007; von Krogh et al., 2003), crowdsourcing (Hosseini et al., 2015), co-opetition (Gnyawali and Park, 2011), university-industry relationships and spin-off (Perkmann et al., 2013; Clarysse et al., 2011; Candelo et al., 2016). Despite the above-mentioned variety, a prevalent part of literature is based on large firms, avoiding to explore a consolidated and flourishing type of organization like start-ups. In an economic environment where technology evolution is relentless and knowledge is increasingly spread, start-ups fulfill a pivotal role in innovation process (Hunt, 2013). Prior studies show that smaller and younger firms are experienced to develop relationships with a wide variety of partners to face several constraints, acknowledged by literature as "liabilities" (Kask and Linton, 2013; Teece, 2010). In comparison with larger firms, start-ups show a lack of managerial, financial, technological and human resources and competences. In this framework these small and emergent companies are looking for a set of partnerships in order to overcome liabilities. In an open and modern approach to innovation start-ups can play a crucial role only if they are strictly linked to other organizations able to compensate their limitations. In fact, existing research on SMEs usually argued about groups of heterogeneous organizations interacting to strengthen start-up companies (Spender et al., 2017).

Literature on large firms is not useless to our aims because many contributions offered suggestions and empirical evidences about the role of SMEs in innovation as knowledge sources for larger partners. These studies (Dodgson et al., 2006, 2008; Lubello et al., 2015) argued how small and large firms can set a complementary relationship where the last act as recipients for the technology produced by the first ones.

The aim of this paper is to provide a literature review on start-ups and innovation, stressing the state of the art on this theme and providing guidance about future paths of research. In particular it sheds light on the main obstacles for start-ups in the early stage. Following prior studies the research question is focused on how start-ups can overcome their liabilities and benefit from their peculiarities in an open innovation context.

Complementing Spender et al. (2017)'s work, this paper contributes to the existing literature in a twofold manner: first by analyzing the main contributions on start-ups and innovation, and second, by identifying the emerging topics and research directions.
The paper is organized as follows. The next section presents our method, followed by a review of the current literature on startups and innovation. Our review enabled us to classify articles according to different focal points. In section three we discuss the main topics emerged from the revised papers and promising areas for future research. The paper ends with implications for theory and practice, and the main limitations emerged.

2. Methodology

This paper aims to investigate innovation in start-up firms through a qualitative research design. The selected methodology was a literature review based on the selection of relevant papers about the current body of knowledge. Because of our purpose, we searched preliminary results for "start-up", "network", "innovation", "open innovation" in several databases such as Scopus, Google Scholar and Science Direct. After a first-stage analysis about titles and keywords we opted for the latter.
Due to the research question we selected as keywords the subject of the study "start-up" and the object of the study "innovation" for the search form, using the usual Boolean string form: *start-ups* AND *innovation* in title, abstract and keywords.
We refined the search with the following filters:
- only journals;
- only in "business, management and accounting" area;
- a time horizon from 2007 to 2017.
- only papers written in English.

The Science Direct database showed us an output of 139 results. After a double-check conducted on title and abstract for each contribution, we excluded:
- those papers that did not deal with the start-up innovation topic or from different research streams;
- those papers mainly focused on spin-off, because of their strong connection with universities they should be investigated separately.

In order to systematize these papers, on the base of their focus, we identified four main topics emerged from the analysis: start-up typical liabilities; knowledge sources and ecosystems; collaboration between start-ups and large firms; future research paths (Table 1 shows a summary of the main contributions).

Tab. 1 - Relevant contributions on start-ups and innovation

Author(s) (year)	Methodology	Emerging topics	Findings
Alberti and Pizzurno, 2017	Social networks analysis method	Start-up typical liabilities	Start-uppers may consider to engage in open innovation practices to accelerate knowledge absorption.
Battistella et al., 2017	Literature review, case study	Knowledge sources and ecosystems	In OI accelerators are crucial players for start-up survival.
Brink, 2017	Longitudinal continuative case study	Collaboration between start-ups and large firms	Start-ups have three ways of collaboration with large companies (supply, demand or partner-driven).
Chesbrough et al., 2014	Case study	Knowledge sources and ecosystems	How a small firm grew and fastly became a business success because of an ecosystem that shares knowledge and trust among partners.
Eftekhari and Bogers, 2015	Case study	Knowledge sources and ecosystems	In an ecosystem, cooperation, user engagement and an open environment directly influence new venture survival, and their effects were moderated by the entrepreneurs' open mindset.
Engel and del-Palacio, 2009	Literature review	Knowledge sources and ecosystems; Future research paths	The creation and development of high potential entrepreneurial ventures depends on a culture of mobility that leads to an affinity for collaboration, development of durable relationships, and the formation of networks.
Fernandez-Olmos and Ramìrez-Aleson, 2016	Quantitative study based on a panel of 44.885 observations	Start-up typical liabilities	Technology collaboration networks are influenced by the macroeconomic cycle, the industry life cycle and the age of the firm.

Ferrary and Granovetter, 2009	Qualitative study based on complex network theory	Knowledge sources and ecosystems	The presence of VC firms opens potential specific interactions with other players in the network (i.e. universities, large firms,...) that determine a particular dynamic of innovation.
Franco and Haase, 2015	Survey based on 106 Portuguese manufacturing SMEs	Start-up typical liabilities	Taxonomy of four types of interfirm alliances such as: Strategic, Improvised, Exploratory and Deliberate.
Henton and Held, 2013	Literature review	Knowledge sources and ecosystems	How a region continues to evolve as a social innovation habitat that supports the diversity of changing technologies and converging industry clusters.
Hottenrott and Lopes-Bent, 2016	Quantitative study based on survey of 2735 German firms	Knowledge sources and ecosystems; Collaboration between start-ups and large firms	Smaller and younger as well as resource constrained firms benefit from relatively higher collaboration intensities.
Kask and Linton, 2013	Qualitative comparison analysis (QCA) on case studies from 16 invention-based start-ups	Knowledge sources and ecosystems	The importance of forming business relationships is critical for the prosperity of start-ups. Findings indicate different solutions leading to high chances of forming business relationships.
Parida et al., 2017	Quantitative study based on survey of more than 3000 high-tech start-ups	Future research paths	Network relationships fail due to lack of network capability (NC). This study supports the importance of NC for small companies and start-ups to remain competitive.
Spender et al., 2017	Literature review	Knowledge sources and start-up ecosystems	Startups are intrinsically open organizations, necessarily engaged in innovation processes.

Spigel, 2017	Case study	Knowledge sources and ecosystems	Ecosystems are composed of cultural, social, and material attributes that provide benefits and resources to entrepreneurs. The relationships between these attributes reproduce the ecosystem.
Usman and Vanhaverbeke, 2017	Case study	Knowledge sources and ecosystems; Collaboration between start-ups and large firms	The paper provides an insight on how start-ups organize and manage open innovation activities with large companies and how it benefits them in overcoming liability of newness and smallness.
Weiblen and Chesbrough, 2015	Case study	Knowledge sources and ecosystems; Models of collaboration between start-ups and large firms	This article maps the new ways large companies can bridge the gap between themselves and the startup world.
Wonglimplyarat, 2011	Case study	Start-up typical liabilities	The study highlights the importance of the government financing programmes as a successful model of institutional framework in promoting start-ups growth.

3. Discussion

As abovementioned our analysis enriches some of the previous findings of Spender et al. (2017). We conducted our research by means of different databases (Scopus, Google Scholar and Science Direct), identifying new relevant aspects about how start-ups overcome their liabilities; what is their role in a network where knowledge is disseminated, stressing a complementary model of collaboration between start-ups and large firms; what is the role played by the ecosystem in supporting them; the main fu-

ture research paths. Start-ups are intended in different ways, depending on the administrative and legislative environment. However most literature seems to agree on the assumption that these smaller entrepreneurial firms are affected by several constraints. In this context the ecosystem play a crucial role in supporting start-ups, in particular in the early stage.

Topic 1: Start-up typical liabilities

In innovation studies a little research stream is focused on start-up firms. First of all literature provides different definitions about these organizations. Several scholars approached this term with different perspectives. Blank (2010) defines a start-up as *"a company, a partnership or temporary organization designed to search for a repeatable and scalable business model"*. According to Robehmed (2013) and Shontell (2014), a start-up is a high growth potential company based on a technology-driven business model. In fact, the word start-up is usually linked to the idea of a new and futuristic technology. Other scholars put more emphasis on the newness matter (Gelderen et al., 2006; Davila and Fosters, 2005), defining a start-up as a new venture. According to Alberti and Pizzurno (2017) a start-up is a not yet established firm that could more easily fail in the market. Following the definition provided by the Cambridge dictionary, a start-up is a small business that has just been started. As a result we can find that start-ups are usually associated with "something new" and "uncertain", just like innovation.
Besides the heterogeneity about what a start-up is, another debate concerns its characteristics. In fact, due to their nature start-ups are affected by different liabilities such as smallness and newness (Freeman et al., 1983; Alberti and Pizzurno, 2017). Start-ups are similar to SMEs, both of them face a liability of smallness as they lack tangible and intangible resources compared to larger firms (Fernàndez-Olmos and Ramìrez-Alesòn, 2016; Franco and Haase, 2015; Wymer and Regan, 2005). First of all start-ups lack of human resources. Before initiating the internal R&D activity, it is fundamental to explore the knowledge available outside the firm's boundaries (Dahlander and Gann, 2010). Such process demands employees like idea scouts, able to identify emerging technologies valuable for the firm, and idea connectors, experienced in integration between external and internal knowledge (Whelan et al., 2011). Many start-ups are composed by a very little group of people, usually with limited managerial and financial resources, and unable to afford these specialized figures (Spithoven et al., 2012). A second liability lies in the firm's technological base. Larger companies accumulated a big portfolio of IP (e.g. patents, trade secrets) and a rich set of competences, routines and technologies. Literature states that

such technological base is a fundamental asset; according to the absorptive capacity view internal R&D enhances company ability to identify and use external knowledge (Dahlander and Gann, 2010; Cohen and Levinthal, 1990). Firms with a solid reputation and IP portfolio are more attractive for possible partnerships (Rosenberg, 1990); there is a reputational benefit because knowledge and expertise engender a ticket of admission to potential partners.
A financial weakness is widely acknowledged by literature. A start-up is by definition a fragile new organization and requires large amount of resources to support its business plan and overcome a troubling initial period. An ecosystem populated by venture capitalists, angels, crowdfunding and investment banks is a crucial factor for start-ups success (Wonglimpiyarat, 2011; Ferrary and Granovetter, 2009). They usually act in the seed and preseed phase where risks and uncertainty are higher. However some industries are more accessible than others. Because of a minor need for physical plants and equipment, costs in service innovation are considerably lower than manufacturing (Criscuolo et al., 2012).
Start-ups share many challenges with SMEs, but their complexities are amplified by the newness, the uncertainty and the high risk characterizing these organizations. This condition is called liability of newness.
A lack of business experience is indeed a severe limitation for start-ups. According to previous studies (Spender et al., 2016; Kaufmann and Schwartz, 2008; Pace, 2013) these firms often have a shortcoming of entrepreneurial experience and they need to build managerial, market and institutional knowledge (Alberti and Pizzurno, 2017). However building complementary assets is a time expensive process and market usually doesn't wait. In this context the open innovation (OI) research stream suggests a way to overcome these issues establishing different relationships with a large variety of external partners aimed to reduce time to market, uncertainty and risks (Chesbrough, 2003).

Topic 2: Knowledge sources and ecosystems

As abovementioned start-ups face disadvantages due to their lack of experience and appropriate assets and capabilities (liability of newness and liability of smallness). In this context young firms engage in different type of relationships to overcome these liabilities (Bogers, 2011; Parida et al., 2017). Prior literature shows that developing relationships with a variety of actors is a priority for start-ups success (Teece, 2010; Usman and Vanhaverbeke, 2017; Battistella et al., 2017; Thomas et al., 2017). These networks of relationships provide start-ups and SMEs access to knowledge and resources (Albano et al., 2016; Hottenrott and Lopes-Bento, 2016; Lee et al., 2010;

Edwards et al., 2005) and help them to generate synergies by exploiting complementary assets and resources with other actors (Zeng et al., 2010). Moreover, engaging in relationships with different partners is particularly critical for start-ups to accelerate innovation process and reduce the time to market. In this scenario start-ups act as recipients of knowledge and resources, according to an outside-in perspective (Metallo et al., 2016; Gassmann and Enkel, 2004).

A recent literature analysis (Spender et al., 2017) indicates that the main resources and knowledge sources for start-ups are: large firms, incubators, Venture Capital (VC) firms, universities, others.

Large firms undertake different activities like corporate VC, internal incubators, strategic alliances to cooperate with start-ups, giving them access to many resources, including expensive equipment and customer access (Weiblen and Chesbrough, 2015). Incubators enhance the development and the innovation process along the lifecycle of start-ups, providing services such as management training or office spaces. They help these young firms by creating a bridge between the pre-seed stage and the commercialization stage (Kaufmann and Schwartz, 2008; Battistella et al., 2017). VC firms provide start-ups different kind of relationships including financial, commercial or technology-based contacts. The literature on start-ups emphasizes the crucial role of VC in creating an efficient start-up ecosystem, as they are able to transfer resources and knowledge between new firms and established actors (Ferrary and Granovetter, 2009). Universities play a leading role in promoting innovation networks. They support start-ups growth and development acting as an important source of knowledge, ideas and creativity (Minshall et al., 2007). Finally in the innovation context there are other actors who interact with start-ups but currently receive less attention by literature (Spender et al. 2017). Prior studies highlight other important knowledge sources such as: customers (von Hippel, 1986; von Hippel and von Krogh, 2003), communities (Antorini et al., 2012; Waguespack and Fleming, 2009) and intermediary organizations (Lee et al., 2010; Zhang and Li, 2010).

The openness to external knowledge sources and the engagement in business relationships for innovation have been recognized as two crucial factors in the early stages of firm development (Carlsson and Corvello, 2011; Kask and Linton, 2013; Eftekhari and Bogers, 2015). However literature highlights that start-ups success is significantly challenged by the innovation and entrepreneurial ecosystem in which they are embedded (Nambisan and Sawhney, 2007; Henton and Held, 2013; Chesbrough et al., 2014). The term ecosystem refers to the overall context in which start-ups operate and has a wider meaning compared to the network. Ecosystems are characterized by the presence of multiple overlapping sets of actors and institutions that support entrepreneurial activity. Spigel (2017) states

that ecosystems are: *"combinations of social, political, economic, and cultural elements that support the development and growth of innovative startups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures"*. They include players to which start-ups are not necessarily linked through direct relationships, but they contribute in creating the start-ups success (Spender et al., 2017).

Based on the analysis of recent works (Spender et al., 2017; Spigel, 2017; Isenberg, 2010; Engel and del-Palacio, 2009) we identified the most important pillars of an innovation ecosystem: mentorship and support systems; favorable government policies; venture capital systems; research universities; availability of an entrepreneurial culture; human capital.

Mentorship and support systems (e.g. incubators, accelerators, intermediaries) provide specialized assistance for early-stage firms and support them fostering the creation of new knowledge, and its transfer to and from start-ups (Ferrary and Granovetter, 2009; Clausen and Rasmussen, 2011, 2015). Large firms, through corporate venture capital and incubation, also contribute to the success of the ecosystem by selecting and mentoring promising start-ups (Weiblen and Chesbrough, 2015; Ferrary and Granovetter, 2009).

Government policies can help to achieve an efficient start-ups ecosystem creating publicly funded support programs that encourage entrepreneurship through tax benefits, investment of public funds, or reductions in bureaucratic regulation (Spigel, 2017). As such, they are a key part of the economic and political context in which a start-up operates. This context may involve reducing legal barriers to firm formation; developing effective tax regimes; or providing public funds to run entrepreneurship support, networking, or incubation programs.

The presence of an efficient system of VCs is considered among the main reasons for the success of a start-ups' ecosystem (Ferrary and Granovetter, 2009). This is proved by the well-known example of Silicon Valley, one of the most competitive venture capital markets in the world, where start-ups are supported by efficient and wide networks of VC agents. These establish relationships with other agents in the network (universities, large firms, R&D laboratories) that are likely to create future innovation ventures (Ferrary and Granovetter, 2009; Engel and del-Palacio, 2009). Other successful ecosystems emerged in Bangalore for software industry (Chaminade and Vang, 2008) and in Israel for high-tech industries (Wonglimpiyarat, 2016). Finally universities play a leading role in the ecosystem development as they provide two main resources. First, they develop new technologies that create entrepreneurial opportunities. Second, they help to develop the human capital and simultaneously foster entrepreneurial culture in its students, encouraging them either to start new ventures or to work within them (Spigel, 2017).

Literature shows that the success of an ecosystem is also related to the geographical proximity. Chesbrough et al. 2014 show that innovation ecosystem benefits may be more readily achieved in regional clusters, since the effect of networks on innovation is amplified by geographic proximity. The availability of tangible and intangible assets, and the networking opportunities provided by the cluster structure can represent a key competitive advantage for both SMEs and large firms (Di Minin and Rossi, 2016). Since knowledge flows more readily to closer entities (Jaffe et al. 1993), the organization and institutional embeddedness of geographically focused networks might be crucial in explaining the differences in effectiveness of innovation in different regions or nations (Engel and del-Palacio, 2009).
Such ecosystem represents a key factor in supporting start-ups growth and their innovation processes, providing not only the infrastructure needed to operate and succeed, but also facilitating their relationships with the other innovation actors.

Topic 3: Towards a complementary model of collaboration between start-ups and large firms

Over the last few years there has been a growing interest of large firms to work with start-ups to commercialize new products/services, but also to create new opportunities (Weiblen and Chesbrough, 2015; Spender et al., 2017; Usman and Vanhaverbeke, 2017). Both start-ups and large firms can benefit from having strategies intended to develop alliances and partnership in an open innovation context. Each side has what the other one lacks (Brink, 2017). The large firm has resources (financial and managerial), scale, market power, and the routines needed to run a proven business model and to transform inventions into innovations. On the other hand the start-up typically has ideas, the willingness to take risk, and aspirations of rapid growth (Weiblen and Chesbrough, 2015). In fact, several authors argued that SMEs have a "dynamic complementarity" because of their major responsiveness to new market opportunities (Brink, 2017; Dodgson, 2014). Moreover young firms have less established routines and skills; as a consequence they are more flexible in adopting new routines. This flexibility also provides start-ups with a high learning potential that can be used in their relationship with partners (Hottenrott and Lopes-Bento, 2016). The study conducted by Alberti and Pizzurno (2017) reveals that when large firms engage in open innovation practices they absorb from start-ups technological knowledge, on the contrary when it comes to managerial knowledge it is start-ups who benefit from collaborations with large firms. According to these research streams start-ups can cooperate with large firms and enter markets for technology, bringing their in-house technologies to market via external paths (Arora and Gambardella, 2010). Large firms, indeed, need

innovation sources upstream, following an outside-in approach. On the contrary, start-ups do not have all the capabilities and resources required to commercialize their technology, so they mainly adopt an inside-out approach (Gassmann and Enkel, 2004). In this context the start-up plays the role of a supplier adopting a collaboration approach based on the complementarity between firms of different sizes. This scenario is beneficial for both partners. The start-up can commercialize its technology without investing in complementary assets; it can have the possibility to serve niche markets not targeted by the large firm; it can invest the royalties in new R&D projects. On the other hand the main benefits for the large firm are: leveraging a new technology without long and expensive research projects; saving its time to market. Furthermore, there is a benefit for both actors in terms of reputation on the market (Usman and Vanhaverbeke, 2017).

Topic 4: Future research paths

The present literature review on start-ups and innovation evidences some future research topics. Although literature shows that start-ups engage in relationships with different kind of partners, they often lack the ability to manage and gain benefits from external relationships (Parida et al., 2017) and should receive formal training to develop these networking abilities (Kaufmann and Schwartz, 2008). According to this research stream it would be interesting to analyzing the role of intermediary organizations in supporting the start-up growth, helping them to build and manage different relationships. With reference to the start-ups knowledge sources, prior studies shed only little light on the role played by communities. Future research can investigate the relevance of relatively new practices to source knowledge (e.g. crowdsourcing). In this context future studies should clarify whether accessing to different knowledge sources positively influence the start-up survival. To what extent these relationships with different actors are sustainable for start-ups? Most studies focus on the benefits of collaborations with partners, but to advance the research stream it would be useful to identify and analyze the main drawbacks of this open approach.
As for the ecosystem, researchers from different domains have independently used and developed the concept in silos; further research are needed to better understand the impact of the innovation ecosystem on start-ups development and success. In particular it emerges a lack of empirical studies on the European start-ups ecosystem; it would be interesting to analyze the impact of EU policies and programs to enhance start-ups' innovation processes. Prior studies closely links the innovation ecosystem success to the role of leading universities. It is the case of the Silicon Valley story where the role of institutions like Stanford and UC Berkeley has been widely emphasized (Bresnahan et al., 2001; Engel and del-Palacio, 2009).

According to this perspective researchers should deepen the role of the university in creating a European start-ups ecosystem. Do universities play a significant role in the development of these ecosystems? How do successful innovation ecosystems organize the interactions between universities, public institutions, and established firms?
With regard to the complementary model of collaboration between start-ups and large firms, future research should provide more empirical evidences on how start-ups and large firms can cooperate in a mutually successful way. Furthermore it would be interesting to analyze this collaboration from another perspective: prior studies agree in defining a collaboration model where the start-up acts as a supplier of technology and the large firm commercializes this technology. Can we use a reverse logic where large firms act as technology suppliers to expand their market, and help start-ups to bring their products to market?

4. Conclusions: Implications and limitations

This work contributes to managerial knowledge mapping the state of the art on start-ups and innovation, and shedding light on some future research paths. By means of a literature review we selected papers published from 2007 to 2017 on start-ups and innovation. From the analysis of prior works we identified four main topics: start-ups liabilities; external knowledge sources and innovation ecosystems; collaboration between start-ups and large firms; future research directions. Literature shows that start-ups, due to their nature, are affected by a liability of newness and a liability of smallness; as a consequence engaging in different kind of relationships with external actors is particularly critical for start-ups success. In particular there is a growing interest of large firms to work with start-ups to commercialize new products, but also to create new opportunities. This collaboration model is based on the complementarity between firms of different sizes and with different capabilities and resources, and it can be beneficial for both start-ups and large firms. Finally it emerges the need of developing specialized figures like intermediaries capable to help start-ups in building and managing relationships with partners.
One of the most critical and inclusive topic emerged from this literature review is the leading role of the innovation ecosystem for start-ups growth and success. Ecosystem has a larger meaning than network and includes policies and agencies aiming to support the dissemination of knowledge and a social accumulation of wealth through start-ups. Ecosystem integrates and enriches the abovementioned sources of knowledge with other relevant players as venture capitalists, incubators and high education system. Such players can support firms in OI processes, both inside-out and outside-in, contributing to the openness mission (Gassmann and Enkel,

2004). Literature on ecosystem is fragmented but it seems to be a general agreement on the central role of financial and support systems, and public institutions. There are important implications especially for policy makers and universities. They can encourage entrepreneurship by means of publicly funded support programs; tax benefits; reductions in bureaucratic regulation; incubation and networking programs. These initiatives are proved to be critical in creating other efficient start-ups ecosystems (e.g. Silicon Valley, Israel). In EU national and supranational institutions should coordinate their efforts and promote holistic policies to foster innovation and entrepreneurship. Unfortunately public policies usually seem to be isolated and focused on single and particular aspects. These efforts proved to be not enough to adequately support start-ups role in the industrial change.
The main limitation of this study is related to its methodology; on one hand it has the benefit of organizing the scientific knowledge on a specific topic, on the other hand it is a theoretical work, lacking of empirical evidence. Moreover another limitation lies in the newness of the topic, there are still different interpretations about what a start-up is, and different perspectives about the ecosystem construct. More quantitative and qualitative research is needed to refine the current literature, and to assess whether a coherent and sold body of literature is developing.

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Riassunto

Le start-up ricoprono un ruolo cruciale nei processi innovativi, tuttavia la letteratura sull'argomento risulta frammentata. Il presente lavoro mira a fornire una maggiore comprensione sul tema start-up e innovazione, e suggerisce futuri sviluppi di ricerca.
Attraverso un'analisi della letteratura sono state individuate le principali aree d'indagine. A causa della loro natura, le start-up sono affette da liability of smallness e liability of newness, e per ovviare a queste mancanze sviluppano relazioni con una pluralità di partner. In un simile contesto, le start-up possono fungere da fornitori o da destinatari di knowledge. Gli studi esaminati, inoltre, rivelano l'importanza del ruolo giocato dall'ecosistema nel favorire il successo di queste realtà imprenditoriali.
Lo studio conferma l'attitudine delle start-up verso la collaborazione con gli attori presenti nel panorama dell'innovazione, e fornisce alcuni spunti di riflessione per la pratica e per future aree di ricerca.

Parole chiave: Start-ups; Innovazione; Ecosistema

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