Papers in Evolutionary Economic Geography

16.30

A critical review of entrepreneurial ecosystems: towards a future research agenda

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Keywords:

Entrepreneurial ecosystem, Entrepreneurial system, Networks, Entrepreneurship, Clusters

JEL-codes:
L26 Entrepreneurship
M21 Business Economics
O33 Technological change: choices and consequences, diffusion processes

Abstract:

The Entrepreneurial Ecosystem (EE) literature has attracted much attention, especially in policy circles. However, the concept suffers from a number of shortcomings: (1) it lacks a clear analytical framework that makes explicit what is cause and what is effect in an entrepreneurial system; (2) while being a systemic concept, the EE has not yet fully exploited insights from network theory, and it is not always clear in what way the proposed elements are connected in an entrepreneurial system; (3) it remains a challenge what institutions (and at what spatial scale) impact on the structure and performance of EE; (4) studies have often focused on the EE in single regions or clusters, but lack a comparative and multi-scalar

perspective; (5) the EE literature tends to provide a static framework taking a snapshot of EE without considering systematically their evolution over time. For each of these shortcomings, we make a number of suggestions to take up in future research on EE.

1. Introduction

The concept of Entrepreneurial Ecosystem (EE) has recently attracted much attention (Stam 2015; Stam and Spigel 2016). Cohen (2006) was the first to use the concept of entrepreneurial ecosystems and defined it as "… an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures" (p. 3). Nevertheless, the ideas behind a systemic view on entrepreneurship are much older (Dubini 1989; Van de Ven 1993). Scholars have stressed the importance of interactions between elements of an entrepreneurial system that would increase entrepreneurial performance of a region.

Despite this wide interest, scholars have also raised concerns. The main objective of this paper is to outline the main critiques and develop a research agenda. We will argue, first, that the EE literature lacks a clear analytical framework that makes explicit what is cause and what is effect. This literature has primarily produced long lists of factors that might matter, but it is not entirely clear what causes what (Stam 2015). Second, the EE literature has expressed strong support for a systemic approach to entrepreneurship. However, there is no universal agreement about the definition of the system, and what are the causal links within the system. There is also little discussion about consequences of missing components or interactions between elements (Mack and Mayer 2015), and almost no reference is made to the network literature, both in theoretical and analytical terms. Third, studies in EE often tend to focus on a particular place or cluster to describe the particular features of EE (Malecki 2011). What most studies lack is a multi-scalar approach that looks at the spatial configuration of linkages that make up an EE. Fourth, the EE literature has not sufficiently explored the institutional and political context of the interactions in EE: what kind of formal and informal institutions matter in EE, and at what spatial scales? Fifth, some scholars have criticized the widespread use of static approaches to EE that merely describe relations in EE (Mason and Brown 2014; Mack and Mayer 2015; Spigel 2015). There is a poor understanding of how EE get established and evolve, and by which processes it develops over time.

The structure of the paper is as follows. Section 2 discusses the popularity of the EE concept, as compared to the entrepreneurial system (ES) concept, and we discuss briefly whether there are notable differences between the EE and ES concepts. Section 3 discusses the rationale behind the EE approach. We address the question of which gaps and weaknesses in the entrepreneurship literature have been identified by EE scholars. Section 4 presents a critical assessment of the EE-literature. Section 5 develops a research agenda that takes up our line of critique. Section 6 concludes.

2. The popularity of the EE-concept

The EE-concept has attracted a lot of attention in a relatively short period of time, especially in policy circles (Isenberg 2010, 2011; Spigel 2015; Mack and Qian 2016). We conducted an article search in different electronic databases in order to get a comprehensive overview over the development of publications on EE during the last decades. The search was performed for all types of documents written in English, for maximum available years, in five different search databases, to achieve a thorough coverage of academic and other literature. The databases included *EBSCO Academic Search Complete* (worlds most comprehensive, multi-disciplinary, full-text database covering 15,800 publication and journals and years 1886-2016), *EBSCO Business Source Complete* (most complete source on business studies with 1,300 business journals covering years 1886-2016), *EBSCO EconLit* (American Economic Association's electronic database, world's foremost source to economic literature covering years 1886-2016), *Web of Science* (world's leading citation databases covering 12,000 multidisciplinary research journals and years 1864-2016) and *Scopus* (the largest abstract and citation database of peer-reviewed literature covering years 1960-2016) (Scopus, Web of Science, EBSCO host, Zott et al. 2011).

We used search string "entrep* ecosystem" to identify the Entrepreneurial Ecosystem literature. We removed conference papers (16 in total) to avoid duplication of research information. The search revealed 392 unique items of which 115 had been published in academic journals, 27 in books and 250 in other, non-scientific outlets like magazines, reports and newspapers. We also conducted a separate search for the concept of Entrepreneurial

System, with the search string “entrep* system”. After removing 12 conference papers, this search provided 85 unique items of which 50 had been published in academic journals, 18 in books, and 17 in other outlets like magazines, reports and newspapers.

A remarkable outcome of our search is that the Entrepreneurial Ecosystem (EE) sample contains almost five times more publications (392 items), compared to the Entrepreneurial System (ES) sample (85 items). Furthermore, as shown in Figures 1 and 2, EE publications are of much younger age, all of them published in the last 17 years, while ES publications cover a much longer period of 44 years. In other words, ES is a much older concept but, apparently, it did not gain as much momentum as the significantly younger concept of EE that saw a dramatic increase in all types of publications, but specifically among other non-scientific publications, in the last six years.

Figure 1. Number of publications on Entrepreneurial Ecosystem 1999-2015

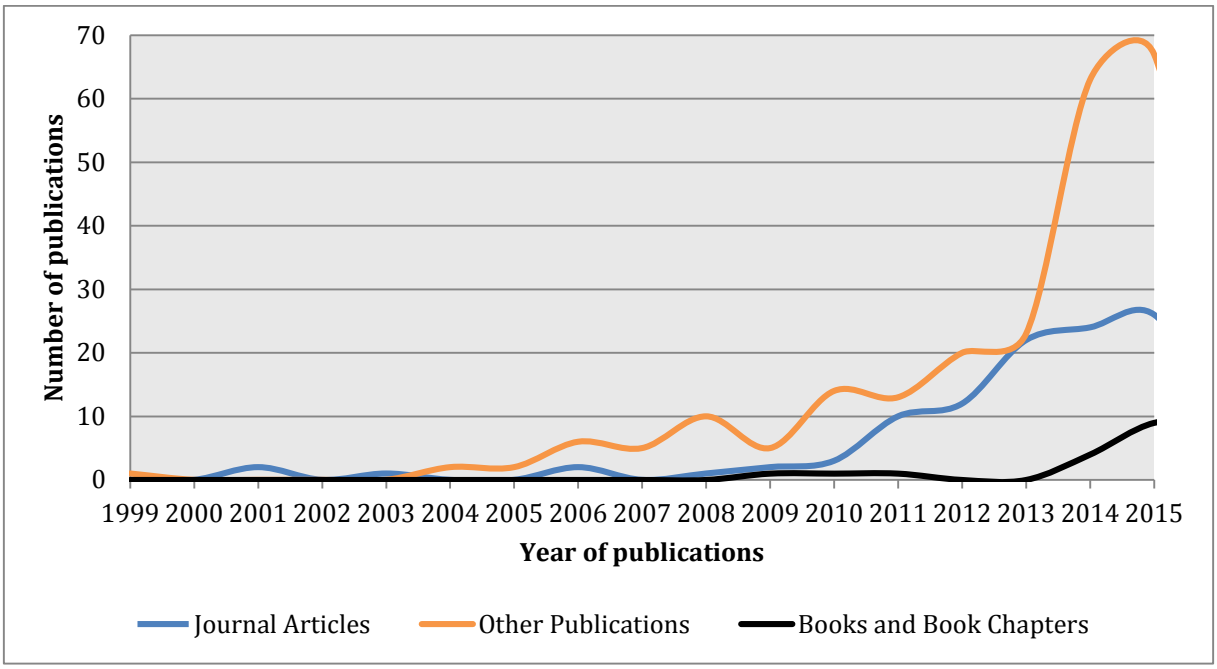
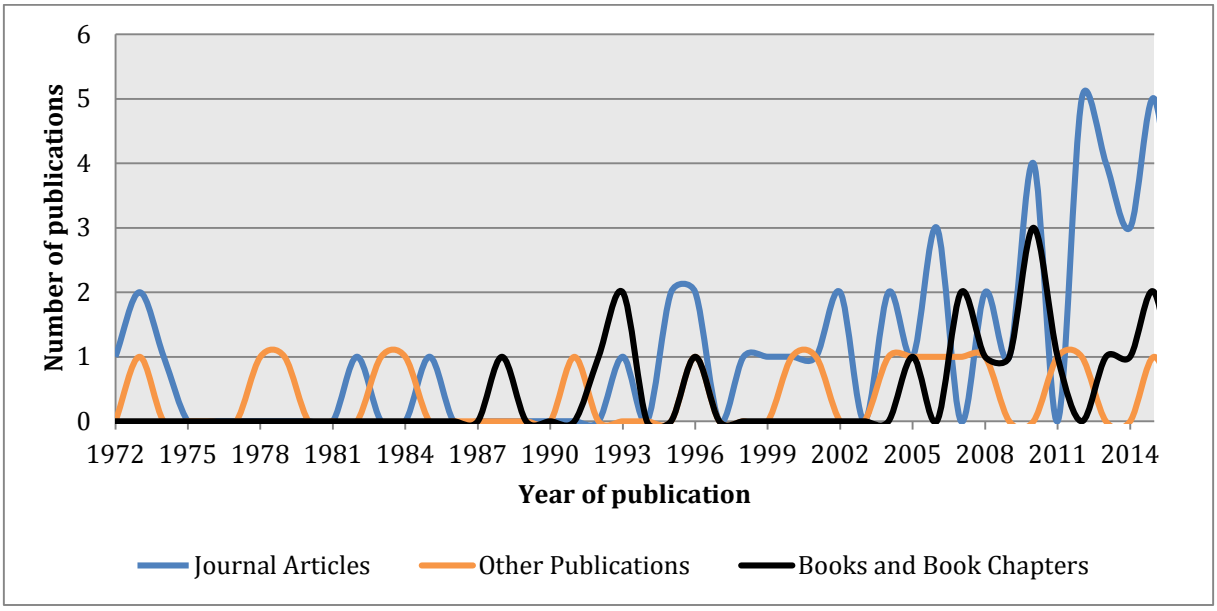


Figure 2. Number of publications on Entrepreneurial System 1972-2015



A relevant question is whether the eco-system part of EE, which originates from the biological and ecological literature, has any particular meaning, and whether this makes it distinct from the ES concept. Sometimes, EE scholars have underlined that systems and eco-systems are not necessarily the same thing. However, it is fair to say that the EE literature makes no sharp distinction between the two, and, indeed, often uses them interchangeably. Moreover, the EE literature is often citing works that refer to 'entrepreneurial system', 'infrastructure of entrepreneurship' and 'regional systems of entrepreneurship' (Van de Ven 1993; Spilling 1996; Neck et al. 2004; Qian et al. 2013) which have a similar meaning as EE, according to some (Cohen 2006; Mack and Qian 2016).

A small group of EE scholars has elaborated on this issue of eco-systems. According to Mason and Brown (2014), the ecological approach of the EE framework has links to 'economic gardening' as a metaphor for local economic development, in which specific environments not only promote high rates of new business start-ups but also high growth firms. Auerswald (2015) compares EE to dynamically stable networks of interconnected organisms and inorganic resources that constitute their own distinct domain of analysis. The biological/ecological view on entrepreneurship helps to establish a structure and relationships in the ecosystem. Ecosystems are depicted as geographically bounded areas with mutually dependent components (Napier and Hansen 2011; Auerswald 2015). However, some scholars have warned that this analogy should not be taken too literally, as EE are man-made systems, rather than natural phenomena (Mack and Qian 2016; Stam and Spigel 2016).

3. The rationale behind the EE-concept

There is a large body of literature on entrepreneurship that dates back to Schumpeter (1934). This literature has been mainly preoccupied with the importance of entrepreneurs for economic development, and which individual features of entrepreneurs matter for successful entrepreneurship. Contextual factors have also been evaluated, but to a lesser extent (Zahra et al. 2014). However, few studies look at entrepreneurship from a truly systemic and interdisciplinary perspective (Qian et al. 2013; Acs et al. 2014).

EE scholars claim that the entrepreneurship literature suffers from several weaknesses. First, the entrepreneurship literature has been mostly preoccupied by the characteristics and behaviors of individuals or firms (Shane and Venkataraman 2000; Shane 2003). EE scholars have pointed to a need to understand entrepreneurship in broader contexts such as their regional, temporal and social settings (Van de Ven 1993; Spilling 1996; Zahra and Wright 2011; Autio et al 2014; Zahra et al. 2014). Second, many EE scholars criticize the lack of a holistic approach to entrepreneurship that focuses on interrelated aspects of entrepreneurship. This is not to say that the link between networks and entrepreneurship has not been investigated. On the contrary, there is a rich literature starting in the late 1980s that explored the role of different networks for new start-up activity, and ethnic entrepreneurship more in particular (O'Donnell et al. 2001; Hoang and Antoncic 2003; Thornton and Flynn 2003). For instance, Birley (1986) investigated formal and informal networks, and Dubini and Aldrich (1991) made a distinction between personal networks and extended networks. However, there is widespread agreement that the systemic role of entrepreneurial activity is still underdeveloped (Gustafsson and Autio 2011; Szerb et al. 2012; Qian et al. 2013; Acs et al. 2014). Third, some entrepreneurship research has treated entrepreneurial opportunities as exogenous, not considering the creation of opportunities as part of the entrepreneurial process (Qian et al. 2013). Instead, in the systemic view on entrepreneurship, agents act upon new opportunities they perceive and mobilize resources from their environment to exploit those (Acs et al. 2014).

4. Definitions and building blocks of EE

The EE literature aims to explain entrepreneurship, and high quality or ambitious entrepreneurship in particular. The latter refers to "individuals exploring opportunities to discover and evaluate new goods and services and exploit them in order to add as much value as possible" (Stam and Spigel 2016, p. 1). This stands in contrast to entrepreneurship in general that is associated with new firms and self-employed. Some EE scholars also refer to intrapreneurship which is associated with entrepreneurial employees in existing activities. According to Bosma et al. (2013), entrepreneurial employees develop "…. new activities for their main employer, such as developing or launching new goods or services, or setting up a new business unit, a new establishment or subsidiary" (p. 7). Other scholars stress the function of EE as creating, discovering and exploiting entrepreneurial opportunities.

Performance of EE depends on interactions between three components: individuals, organizations and institutions. Individuals are separated from organizations and are of particular importance in the EE, as not all individuals are connected to a firm while considering a market opportunity (Qian et al. 2013). The entrepreneur has a central place in the EE and is the core actor in building and sustaining the ecosystem. This view is made explicit in the definition of National System of Entrepreneurship by Acs et al. (2014) as "… the dynamic, institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures" (p. 479).

Stam and Spigel (2016) define EE as "a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory" (p.1). Mason and Brown (2014) define the EE in a more detailed manner as "a set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (e.g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e.g. the business birth rate, numbers of high growth firms, levels of 'blockbuster entrepreneurship', number of serial entrepreneurs, degree of sellout mentality within firms and levels of entrepreneurial ambition) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment" (p.5). Qian et al. (2013) define ES as "those economic, social, institutional and all other important factors that interactively influence the creation, discovery and exploitation of entrepreneurial opportunities" (p.). Creation of new opportunities is seen as essential to ES.

Entrepreneurship is seen as embedded in social relationships (Nijkamp 2003; Stuart and Sorenson 2005). The capital that an entrepreneur derives from social relationships can come in forms of (1) new knowledge about opportunities and technologies that spills over between firms and universities (Owen-Smith and Powell 2004), (2) financial means as information assymetry is reduced when investors use their social networks to identify new firms (Shane and Cable 2002; Fritsch and Schilder 2008; Steijvers, Voordeckers and Vanhoof 2010), (3) trust to reduce market costs (Doloreux 2005), (4) entrepreneurial skills that are shared in networks between entrepreneurs and mentors and supported by entrepreneurial organizations (Stam and Spigel 2016), (5) access to worker talent, (6) access to customers and suppliers (Spigel 2015), and (7) in the form of collective learning capacity which is enhanced by a local network of mainly informal social relationships (Doloreux 2005). Mason and Brown (2014) refer to the importance of 'bridging assets' or 'liason-animators' who are people that become key connectors between 'people, ideas and resources' (p. 11).

The EE literature refers to elements or attributes and interactions between those elements (Spilling 1996). Isenberg (2011) indicates that elements of the EE interact in complex and specific ways that lead to unique configurations of different EE. Spigel (2015) focuses on elements that develop simultaneously and reinforce each other: "an ecosystem's attributes are sustained and reproduced through their relationships with other attributes" (p.8). These relationships may have different densities in EE. In a low density EE, one attribute may be more dominant and drive the other attributes, like a strong local market can support inflow of opportunities, whereas in a high density EE, the elements support each other in a more balanced and stronger manner (Spigel 2015). Even though elements can support each other, they can never completely replace one another (Acs et al. 2014). Feld (2012) refers to the importance of interactions in a successful start-up community and a high network density among actors and groups of actors, where everyone is willing to contribute to the ecosystem.

Taking a systemic view, the EE literature tends to move the entrepreneurship literature in the direction of the Innovation System (IS) literature (Freeman 1987) that investigates how networks of actors are involved in the generation, diffusion and use of innovations, and how institutions influence these interaction patterns (Qian et al. 2013). However, this Innovation System literature with its main focus on organizations and institutions has not made explicit links with entrepreneurship (Landström et al. 2012; Acs 2014; Landström et al. 2015). Moreover, a system approach to entrepreneurship has not been taken up systematically in the Innovation System literature (Qian et al. 2013). As Acs et al. (2014) put it, "it is perhaps a

little surprising, if not even ironic, that although the NSI literature was heavily influenced by the Schumpeterian tradition, the entrepreneur remained conspicuously absent in this literature" (p. 477-478).

Most definitions agree that an EE has a geographically defined boundary that includes different interconnected actors and factors such as human capital, networks and institutions. While the boundary of the system, when it is defined geographically, can in principle be on any scale (Qian et al 2013), studies on EE have often looked at specific high-tech places like the Boulder County and Phoenix in the US, and Waterloo, Calgary and Victoria in Canada (Neck et al. 2004; Cohen 2006; Feld 2012; Mack and Mayer 2015; Spigel 2015). Doing so, the EE literature links clearly to research on clusters (Mason and Brown 2014) that suggests that clusters provide opportunities for entrepreneurship, such as a specialized labor market or geographically localized knowledge spillovers (Rocha and Sternberg 2005; Delgado et al. 2010). Interestingly, the cluster literature is increasingly adopting a network approach, showing it is not just the presence in a cluster that enhances the performance of firms but their position in local knowledge networks (Boschma and Ter Wal 2007; Giuliani 2007). There exist yet few studies on entrepreneurship in clusters that take an explicit systemic approach, let alone they study the configuration of networks in EE (Motoyama and Watkins 2014).

5. A critical assessment of EE

Despite its popularity, the EE concept is suffering from a number of weaknesses that makes it currently problematic to apply both in academic and policy circles.

First, the EE literature is still in search for a clear analytical framework that makes explicit what is cause and what is effect (Stam and Spigel 2016). This literature has primarily produced long lists of factors that enhance entrepreneurship. Those lists contain usual suspects like human capital, education, universities (see e.g. Fayolle and Byrne 2010; Rice et al. 2010), access to knowledge, supply of (risk) finance, (private and public) customers, a wide range of support organizations (including infrastructure), regulatory frameworks (like laws or tax incentives), leadership including role models (Isenberg 2011; Stam 2015), and cultures that enhance entrepreneurial activity, like high tolerance of risk and failure, an open attitude towards experimentation, and a positive image of entrepreneurs (Isenberg 2011; Spigel 2015). These lists of elements have been investigated in the entrepreneurship literature

before, which makes it rather unclear what the value-added of introducing a new concept like EE is in the first place. And when these elements are presented as a complex ecosystem in which all elements are perceived to influence each other, as often happens in the EE literature, it becomes extremely complex to disentangle what causes what.

Second, the EE framework is presented as a system or network that consists of many interacting elements with highly complex relationships. EE scholars apply different definitions of networks that consist of many elements. The definition of networks used by Neck et al. (2004) is "a set of nodes (for example, persons, organizations) linked by a set of social relationships (for example, friendship, transfer of funds, overlapping membership) of a specific type" (p. 201). Spigel (2015) refers to networks as the "presence of social networks that connect entrepreneurs, advisors, investors, and workers, and that allow the free flow of knowledge and skills" (p. 8). Motoyama and Watkins (2014) have criticised the EE literature for adressing the elements of the system without giving proper attention to the connections between them, and treating all elements as equally important. Moreover, the EE literature suggests that networks connect elements at the aggregate level of EE, but also considers networks as just one element that is part of a larger EE. And finally, almost no reference is made to the network literature, both in theoretical and analytical terms. Social network tools have been applied to the field of entrepreneurship studies, such as assessing the impact of weak ties and structural holes in networks on the thriving of new ventures, but only since very recently (Ter Wal et al. 2016). The EE literature has not yet produced a comprehensive network approach that could shed light, for instance, on the crucial question why some EE are able to make vital connections while other EE fail to do so.

Third, studies in EE often tend to focus on a particular place or cluster to describe the particular features of EE. Although empirical investigations have showed large differences in the rates of entrepreneurship across regions (see e.g. Acs and Armington 2006; Motoyama and Watkins 2014), it is not entirely clear how the EE can explain such differences between regions. More in general, studies in EE lack a multi-scalar approach that focuses on the relative importance of non-local versus local linkages, or what kind of institutions at different spatial scales matter in EE. Some scholars (e.g. Malecki 2011) have put an emphasis on the importance of global connections between different entrepreneurial ecosystems, as the ability to integrate global knowledge is considered important for firms to become successful in their home EE. Multinational corporations (Mason and Brown 2014) are perceived to attract skilled employees to the region, upgrade managerial skills of local firms, operate as a source for spin-

off firms (Neck et al. 2004), and provide business opportunities for local firms to access global markets. However, concerns have also been raised about such interactions, as they may lead to losses of revenues for early-stage companies (World Economic Forum 2013).

Fourth, the EE literature has been criticized for applying a static framework that describes relations in EE without considering their evolution over time. More in general, the empirical analysis of the dynamics of networks in entrepreneurship studies is still rare, although conceptually, it has attracted wide attention (Hoang and Antoncic 2003). For instance, Hite and Hesterly (2001) proposed that networks of emerging firms change from their emergent to their early growth stage, as embodied, for example, in a shift from cohesive networks to networks that exploit structural holes. Scholars have claimed that the elements of EEs will shift in importance and in their connections as they evolve (Mason and Brown 2014; Mack and Mayer 2015). Such a dynamic EE framework needs to make explicit which elements and relations matter in which stage, and how they influence each other over time.

6. Towards a new research agenda

As mentioned earlier, while EE literature incorporates a systemic dimension to entrepreneurship, little to no reference has been made to network theory. Also, network analysis has hardly been exploited as a tool[1] while its relevance has proven useful in cluster research when focusing on the structure of knowledge networks in clusters (Ter Wal and Boschma 2009). For instance, Giuliani (2007) showed that location in clusters does not necessarily enhance the performance of firms (as claimed by the cluster literature) but their position in local networks in clusters does. Accordingly, knowledge is not just 'in the air' in clusters but rather circulates in structured networks. Not all cluster firms are connected equally, and high performing cluster firms have primarily non-local linkages (Boschma and Ter Wal 2007). This type of network analysis at the micro-level can be applied to entrepreneurial ecosystems.

At the meso-level of EE, there is also potential to apply network analysis. Cohen (2006) suggests to examine how each element of the EE can be developed and maintained, what

[1] Auerswald, (2015) suggested to map the ecosystem by e.g. creating a graph with actors (the nodes), their interactions (edges), and revealing their roles and relationships by type, direction and magnitude.

impact a weakness in one or several components can have on the performance of an entire EE, and how the elements are interdependent on each other. Such a network approach could reveal what are the minimum requirements in terms of network structure to qualify as successful EE (Ter Wal et al. 2016).

The nature of network ties can be described in proximity terms to investigate how types of links, besides individual characteristics (like education and work experience, see Cooper et al.1991) enhance entrepreneurship (Boschma and Frenken, 2010; Balland 2012a, 2012b). The network literature has referred to that fact that network structures might hamper the entrepreneurial process when they become too inward-looking and too cognitively or socially proximate (Boschma 2015). Crespo et al. (2014) have suggested that a closely tied core in the local network and high proximity between network partners may negatively affect radical entrepreneurship, as such networks suffer from lock-in and a shortage of recombination possibilities. Local network structures may also become too fragmented, with few connections between nodes and a lack of proximity. These networks give access to new and non-redundant knowledge but also lack regional cohesiveness that weakens the ability to pursue collective action and to interact and learn from others (Boschma 2015). To an increasing extent, research is searching for optimal levels of proximity between agents, as too little proximity hampers coordination while too much proximity may lead to lock-in (Grabher and Stark 1997; Nooteboom 2000; Boschma and Frenken 2010). Applying such a proximity approach to networks could contribute to developing an analytical framework in EE that takes up a systemic perspective on entrepreneurship.

So, there is potential to do comparative research on the network structure in EE that could provide answers to questions like: do dense networks in EE enhance entrepreneurship, do EE with a large variety of nodes perform better (Auerswald 2015), what types of linkages in EE do matter, and do EE with non-local linkages show more entrepreneurial dynamics? For instance, Balland et al. (2013) suggests that a core/periphery network structure that combines a cohesive core structure with a periphery of loosely connected organizations promotes knowledge circulation and new ideas while avoiding lock-in. In a recent paper, Ter Wal et al. (2016) provide evidence that the chance of new ventures' success is positively influenced by a combination of what they refer to as 'open-specialized' and 'closed-diverse' networks.

EE's can also be perceived of consisting of different networks, like knowledge networks, political networks, networks of entrepreneurs, financial networks, etc. A research challenge

here is to explore how these different subnetworks connect to each other, to what extent there is an overlap between the networks, what are the implications of different degrees of overlap between networks for the performance of individual entrepreneurs and of the EE as a whole, and which agents act as true boundary spanners connecting the different subnetworks and therefore make a difference?

Entrepreneurship is not only about firms but also about institutional entrepreneurs (Maguire et al. 2004). Indeed, it is crucial for our understanding of EE to study the actions of institutional agents like firms, policy, or any other group in society (like professional organizations, consumer groups, interest groups, and so forth), as radical entrepreneurship depends on the mobilization of resources and the creation or transformation of institutions at various spatial scales (Garud et al. 2002; Strambach 2010; Sotaurata and Pulkkinen 2011; Marquis and Raynard 2015; Binz et al. 2016). This requires more understanding of which actors induce institutional change and how (Sine and Lee 2009), and why institutional entrepreneurs are more successful in transforming institutions in some regions but not in other regions. The question is whether there are conditions at the local or national scale that facilitate such strategic collective action, and make institutional entrepreneurs more successful in building legitimacy and shaping institutions to enable radical entrepreneurship (Battilana et al. 2009; Boschma 2016). In this respect, the entrepreneurial experimentation literature (Smith and Raven 2012) draws attention to the role of power and vested interests that may block such institutional change (Wesseling 2015). We still have little understanding of whether some places provide more opportunities than other places to overcome such institutional resistance and develop into a dynamic EE. Favorable places might be those where vested interests are not well represented or do not dominate the design of local institutions, but systematic evidence is lacking (Boschma 2016).

As stated earlier, the EE framework lacks a dynamic perspective that could also make the EE framework more analytical. Mack and Mayer (2015) made a first attempt to present an evolutionary model that deals with EE dynamics over time in a stylized manner. In their model, the birth phase is characterized by only a few visible entrepreneurs and a risk adverse culture. Also, there is very little financial capital, and support organizations emerge. In the growth phase, several elements are developing specifically towards entrepreneurship, as markets become national and global, networks get denser, visible entrepreneurs become role models and improve the entrepreneurial culture, and supports become more specialized. Next phase is the so-called sustainment phase. In this phase, there is severe decline in the number

of serial entrepreneurs as they start to give preference to employment, venture capital becomes harder to get and there is a lowered entrepreneurial focus in education and supports elements. The last phase is the decline phase during which markets, networks, financial capital and supports decline or disappear. At this stage, EE will cease to exist or a new cycle will start (Mack and Mayer 2015). Interestingly, Mack and Mayer (2015) also focus on the changing role of policy in the different stages of an EE.

Mason and Brown (2014) present a different evolutionary model on EE in which it all starts with the region being attractive based on assets like strong technological knowledge base represented by large firms and educational and research organizations that attract governmental research funding. These organizations produce and attract human capital and entrepreneurs to the region. Venture capital is not considered part of the initial conditions of the EE: it rather waits for successful entrepreneurial activity to appear. As a second step, the growth of the EE depends on the spin-off process in which existing firms form a source for a new generation of spin-offs in the region. Following the spin-off process that leads to the creation of the self-sustaining critical mass of new firms, support organizations and venture capital develop and are attracted to the region. Around this time, 'entrepreneurial recycling' is in place when successful entrepreneurs start even more firms and take on roles as financiers and mentors. Failed firms, at this stage, provide resources for redistributed capital and new entrepreneurs or employees. In the Mason and Brown framework, the well functioning EE may become victim of exogenous and endogenous shocks. The evolutionary model of Mason and Brown gives clues for how the next phase is achieved by the EE. However, an explicit network dimension in this evolutionary approach is still lacking (see Ter Wal and Boschma 2011). Is some component more important, and in which stage of development of an EE? Are there components that need to be in place before further development can continue?

7. **Conclusions**

The EE literature aims to explain (ambitious) entrepreneurship from a system or ecosystem perspective. It is a rapidly expanding but relatively new literature, although scholars have mentioned similar principles but used different expressions in the past. Based on a literature review, we identified a number of weaknesses in the current EE literature: (1) a clear analytical framework is missing that makes explicit what is cause and effect in an EE; (2) it is not always clear in what way proposed elements are connected in an entrepreneurial system,

and which interactions matter most; (3) it remains unclear which institutions, and at what spatial scale, have an impact on the structure and performance of EE; (4) EE studies often follow a case study approach of a region but lack a comparative and multi-scalar perspective; (5) the EE literature has adopted a static framework of EE without considering their evolution over time.

We have made a number of suggestions drawing from different literatures to tackle these weaknesses in a future research agenda on EE. We claimed that the network and the EE literature should be more tightly connected, as the network literature has the potential to enrich the EE-concept both in theoretical and analytical terms. First, network analysis provides tools to determine whether a certain case can be defined as an entrepreneurial ecosystem or not, or whether it is a strong or a weak system. Moreover, it enables us to identify different types of EE and make a comparative analysis between different types of EEs which would reveal new insights in the entrepreneurship literature. We discussed how the internal structure of knowledge networks in a region as well as their openness to the outside world could matter for entrepreneurship. We proposed that such an EE perspective should consider the structural properties of networks and the nature of network relationships (in terms of various dimensions of proximity), and how that enhances entrepreneurship. This will contribute to developing an analytical framework of the EE concept.

We proposed to integrate institutions more deeply in the EE literature. Surely, the entrepreneurship literature has focused on the role of institutions and culture like social capital (Westlund and Adam 2010). We propose to include a dynamic perspective on institutions in EE that contains the following elements: (1) focus on institutional change, as EE might provide opportunities to create new or adapt existing institutions, to enable radical entrepreneurship; (2) focus on institutional entrepreneurship at the micro-level that requires understanding of which agents are responsible for institutional change, why agents in some EE are more successful in creating and adapting institutions, as compared to other regions, and whether there are specific conditions in regions that provide more opportunities for strategic action and institutional entrepreneurship, and make local agents more successful in changing institutions; (3) emphasis on institutions that question and block institutional change, and prevent regions to turn into dynamic EE. We hypothesized that successful EE require places where vested interests are not well represented or unable to dominate local institutions (Boschma 2016).

Finally, we proposed an evolutionary perspective that accounts for the evolution of EE. Such an evolutionary framework makes it possible to compare different EE in their evolution and performance over time: which mechanisms makes EE move from one stage to another, and which different types of connections in the EE are more important (Eisenhardt and Schoonhoven 1996)? This requires a dynamic network approach to EE which is still lacking (Ter Wal and Boschma 2011).

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