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Abstract

Entrepreneurial Ecosystems (EEs) are expected to support high growth entrepreneurship. Yet, little is known about how they actually promote entrepreneurial activities. Based on Giddens' structuration theory, this paper takes the entrepreneurs' perspective to understand how they actually use the resources provided by an EE. Based on semi-structured interviews with entrepreneurs and other relevant actors in the Berlin EE along with participant observation at entrepreneurship events, this case study focuses on the resourcing practices of different types of entrepreneurs. It shows that the Berlin EE comprises two distinct subsystems. On the basis of this evidence it is proposed that EEs can have different degrees of integration and that this characteristic strongly impacts how entrepreneurs can actually acquire resources from the EE and thus how specific EEs promote different types of entrepreneurs. Heterogeneous structures therefore do not only exist between EEs but also within EEs. This heterogeneity needs to be recognised in order to understand how EEs function, enhance the comparability of research results, and design suitable political instruments to promote entrepreneurship effectively.

Key words: entrepreneurial ecosystems, resourcing practices, structuration theory, high-growth entrepreneurship

1. Introduction

Over the past two decades, researchers have increasingly begun to recognize the importance of analyzing the context of entrepreneurship (Welter 2011; Garud, Gehman, and Giuliani 2014; Autio et al. 2014; Ozgen and Baron 2007). In this line of research, *entrepreneurial ecosystems* (EEs) have emerged as one of the key concepts (Alvedalen and Boschma 2017; Malecki 2017). The central question of this research strand is: *Which elements promote successful entrepreneurship in a region?* Several elements that support entrepreneurship have been identified, such as risk capital, universities, policies, support organizations, worker talent and a supportive culture (Spigel 2017; Alvedalen and Boschma 2017; Isenberg 2011). Across regions, we find heterogeneous entrepreneurial ecosystem (EE) configurations (Brown and Mason 2017), but we still do not fully understand how these different configurations promote entrepreneurs specifically.

Although the question of how EEs influence entrepreneurship is highly relevant, two major gaps persist that hinder a full understanding of how different configurations of EEs actually promote entrepreneurs. First, the concept of EE lacks a strong theoretical foundation and a theory of how the elements of EEs interact (Spigel and Harrison 2018; Malecki 2017; Alvedalen and Boschma 2017). Second, we know little about how entrepreneurs actually make use of EEs (Motoyama and Knowlton 2017). How they do so might vary between different types of entrepreneurs since different types may need different resources—start-up entrepreneurs may, for instance, require a different set of resources than university spin-off entrepreneurs (Elfring and Hulsink 2007; Powell and Sandholtz 2012; Rasmussen, Mosey, and Wright 2015). If this is true, different types of entrepreneurs might benefit from different elements of EEs, and different substructures of EEs might promote different types of entrepreneurs. To develop a more differ-

entiated understanding of the co-existence of different types of entrepreneurs and heterogeneous substructures within a single EE, the question of this paper is the following: *How do EEs promote different types of entrepreneurs?*

To develop a more precise understanding of how EEs promote entrepreneurship—and, more specifically, how different configurations of EEs promote entrepreneurship in certain ways—we do not only need to know which elements are necessary and how these elements interact with each other (Spigel 2017; Stam and Spigel 2016) but also—and most importantly—how entrepreneurs actually make use of them (Motoyama and Knowlton 2017). It is necessary to take account of action and structure—and Giddens' (1984) structuration theory does exactly that (Sarason, Dean, and Dillard 2006). It enables us to explain how the structure of an EE enables and constrains the actions of entrepreneurs, and how entrepreneurs (re-)produce the structure of the EE through their actions.

This embedded single case study (Yin 1994) of the Berlin EE compares the resourcing practices of three types of entrepreneurs: (i) start-up entrepreneurs, (ii) university spin-off entrepreneurs, and (iii) entrepreneurs funded through the Federal Ministry of Economic Affairs and Energy's Exist program. While the resourcing practices of university spin-off and Exist entrepreneurs show a considerable number of similarities, the resourcing practices of start-up entrepreneurs are rather different. Start-up entrepreneurs predominantly acquire entrepreneurial knowledge and financial capital from or via the entrepreneurial community. University spin-off and Exist entrepreneurs rely foremost on public funding programs and public investors as well as on the university's incubator, its events, and recommended coaches. It becomes apparent that the different types of entrepreneurs are embedded in two distinct subsystems, pointing to the *fragmentation* of the Berlin EE. These findings indicate that heterogeneous structures might not only exist between but also within EEs.

The insights from this empirical study and previous research on EEs in other regions suggests introducing a new theoretical construct, namely, the *integration* of EEs. It is argued that the integration of an EE strongly impacts how EEs support entrepreneurship. EEs can exhibit different degrees of integration and can thus be either highly integrated or fragmented into subsystems accordingly. The fragmentation of the Berlin EE into two subsystems (re-)produces different resourcing trajectories for different types of entrepreneurs and conversely, their different resourcing practices reproduce these subsystems. Consequently, the actors in the Berlin EE promote distinctive types of entrepreneurs.

In section two, this paper conceptualizes EEs from a structurationist perspective. Section three outlines the design of the qualitative case study. Section four compares the identified resourcing practices, elaborates on the relationship of the two subsystems within the Berlin EE, and develops the new theoretical construct of a *fragmentation* of EEs. Section five discusses these findings with respect to previous research, indicating that EEs do not necessarily have to be fragmented but might show varying *degrees of integration*, and develops propositions about the causes and consequences of different degrees of integration. These might inspire and guide future research. The final section draws conclusions for future research.

2. Conceptualizing entrepreneurial ecosystems from a structurationist perspective

To develop a more comprehensive understanding of how EEs actually promote different types of entrepreneurs, we (1) need a theoretically grounded conceptualization of EEs and (2) more closely investigate how entrepreneurs actually acquire resources from their EE. Giddens' (1984) theory of structuration offers an approach to deal with these requirements. Structuration theory emphasizes that actors and social systems co-evolve, as illustrated in figure 1. Thus, it offers huge potential to explore the link between the actions of entrepreneurs and the EE in which they are embedded (Jack and Anderson 2002). Entrepreneurial action is guided by structure, and structure is created by entrepreneurial action (Chiasson and Saunders 2005). The

actions of the entrepreneurs are as much enabled and constrained by the structures of the EE as they (re-)produce them (Sarason, Dean, and Dillard 2006). Although this approach has long been established in management studies (e.g., Barley and Tolbert 1997; Sydow and Windeler 1998; Whittington 2010), it is only rarely considered in EE discourse.

In the following, EEs will be conceptualized from a structurationist perspective along three implicit, more or less critical assumptions made by previous EE research: an EE is a specific environment for entrepreneurs that (1) comprises several elements whose sheer presence promotes entrepreneurship, (2) is regionally bounded, and (3) is homogenous in that it promotes all kinds of entrepreneurs equally. But how does an EE actually promote entrepreneurs? This paper argues that this question is best answered by focusing on the resourcing practices of entrepreneurs.

--- Insert figure 1 about here---

2.1 Defining entrepreneurial ecosystems as social systems

Driven by political efforts to promote innovative, high-growth entrepreneurship in certain regions (Isenberg 2010; Mason and Brown 2014), EE discourse has predominantly focused on identifying success factors, often based on successful EEs and best practices (Isenberg 2011; Stam 2015). A broad consensus can be identified regarding the supportive effect of investment capital, research universities, entrepreneurial knowledge, an entrepreneurial community, and a conducive culture (Spigel 2017; Isenberg 2011).

The vast majority of previous studies and conceptual frameworks more or less implicitly assume that an EE will be successful as long as certain actors and factors (Spigel 2017; Stam and Spigel 2016), domains (Isenberg 2011), and components (Alvedalen and Boschma 2017) are present. The great diversity in terminology in itself points to a lack of theoretical foundation and cohesion. It remains unclear which elements entail which consequences (Stam 2015; Motoyama and Knowlton 2017) and what happens if some elements are missing (Mack and Mayer 2016). By focusing on “*the essential ingredients*” (Malecki 2017, 5) and writing “*laundry lists*” (Spigel and Harrison 2018, 158), this discourse has widely neglected any reasoning on cause and effect and the interplay of these elements, or, as Malecki (2017, 5) puts it, on the “*recipes*” for their combination.

Understanding the impact and interplay of certain elements requires analytically distinguishing different types of elements. Previous studies have predominantly analyzed which actors, rules, and resources are involved in a specific EE without analytically distinguishing between actors, rules, and resources. Structuration theory does exactly that. By distinguishing actors who interact in a social system and rules and resources as the structure of the social system, it offers a theoretically well-grounded conceptualization of EEs.

The EE is a social system and as such comprises the “*reproduced relations between actors or collectivities, organized as regular social practices*” (Giddens 1984, 25) aimed at providing “*resources specific to the entrepreneurship process*” (Spigel 2017, 52). This definition sharpens our view for different actors providing similar resources or a single actor providing more than one resource. In different EEs, different actors might provide comparable resources. EEs thus do not only vary according to the resources they provide but also with respect to the actors through which entrepreneurs can access them. If resources are available but some actors are not, the resources might be accessed through other actors, leading to functional equivalents and equifinal resourcing practices (Hallen and Eisenhardt 2012).

Resources cannot be conceptualized apart from rules (Giddens 1984). How entrepreneurs evaluate resources, and whom they see as suitable actors to acquire them from, is influenced by normative aspects and socially constructed criteria that might vary between EEs. As Figure 1

shows, the rules of one EE might constitute financial capital as a necessary resource for the founding process and define angel investors as suitable actors to acquire it from. By contrast, the rules of another EE might legitimize a public funding program. These rules and resources are reproduced in social practices, that is, in action patterns distributed in time and space. Consequently, to understand how EEs promote entrepreneurship, the focus shifts from the question of *which actors and factors are important* to *which resources are legitimized by the rules of the EE and how and from whom can entrepreneurs acquire them*.

2.2 Boundaries of entrepreneurial ecosystems

Although there is no agreement on the scope of an EE (Audretsch 2015; Autio et al. 2018; Acs et al. 2017), the majority of research focuses on regionally bounded environments, often cities or metropolitan areas (Audretsch and Belitski 2017; Ferrary and Granovetter 2009). In addition to the flourishing and prominent example of Silicon Valley (Saxenian 1996; Bahrami and Evans 1995), other regions such as the area around Route 128 in Boston (Saxenian 1996) and the Washington metropolitan area (Feldman 2001) have also been analyzed. Other authors have focused on cities, such as Waterloo and Calgary (Spigel 2017), Victoria, Canada (Cohen 2006), or St. Louis (Motoyama and Knowlton 2017), Boulder (Neck et al. 2004), and Phoenix (Mack and Mayer 2016), USA.

According to a structurationist approach, actors are only part of an EE if entrepreneurs (and other actors) recognize them as such and refer to them in their practices. Rules and resources only exist to the extent that they are actualized in social practices. Consequently, the boundaries of an EE have to be defined empirically. Only those actors, rules, and resources are included in the analysis of an EE that are actually recognized as important by entrepreneurs and other relevant actors. If the boundaries are set from an outside perspective, the researcher might identify certain actors as important, but the actors involved in the EE might not share that assumption. Empirically identifying the actors and resources that entrepreneurs actually refer to in their practices also enables us to identify heterogeneous substructures within an EE.

2.3 Heterogeneity between and within entrepreneurial ecosystems

Although previous research has predominantly portrayed EEs as homogenous environments, their heterogeneity has been implicitly addressed in three ways. First and foremost, EE research has emphasized heterogeneity across regions yet implicitly treated each EE as a homogenous environment for entrepreneurship within a region. Second, a few studies have focused on a specific EE that has emerged around one type of entrepreneur, implicitly raising, yet failing to address, the question whether there are also other types in the same region who operate within the context of their own EEs, and how these might relate to each other. Third, network research has emphasized the differences between different types of entrepreneurs yet has neglected the causes and effects at the EE level.

(1) One of the key findings of EE research is that EEs in different regions have their particularities (Spigel 2017; Feldman 2001; Saxenian 1996). Entrepreneurship is often shaped by these particular exogenous factors (Feldman 2001; Audretsch and Belitski 2017). Consequently, these reactions vary, resulting in different EE designs. Cultural peculiarities in a region (Saxenian 1996) or the presence of a very strong industry (Spigel 2017) can lead to different configurations and modes of functioning of EEs. Despite this strong emphasis on regional differences, the EE in a specific region is mostly treated as a homogenous environment for all types of entrepreneurs there. A few recent studies, however, have argued that entrepreneurs in the same region might engage differently with the EE. Brush et al. (2018), for instance, found that it is more challenging for women than for men to acquire resources from an EE, which suggests that entrepreneurs with different characteristics might not have the same access to resources. Similarly, Qin, Wright, and Gao (2019) show heterogeneity within a single accelerator and emphasize that various entrepreneurs pursue different strategies of making use of this

accelerator program. Interestingly, both studies nevertheless conceptualize the EE as a homogeneous environment for all entrepreneurs; what varies is their abilities or strategies to make use of it.

(2) Other studies focus on one type of entrepreneur and the EE that has evolved around that one type—for example, technology entrepreneurs (Spigel 2016), entrepreneurs involved with sustainability (Cohen 2006), social entrepreneurs (Thompson, Purdy, and Ventresca 2018; McCarthy 2012), or university-related entrepreneurs (Schaeffer and Matt 2016; Youtie and Shapira 2008; Kenney, Nelson, and Patton 2009). Thompson, Purdy, and Ventresca (2018), for instance, focus on the emergence of a social entrepreneurship EE in Seattle. Although it is not their issue of concern, their study suggests that commercial entrepreneurship might have its own subsystem alongside social entrepreneurship. The same applies to Schaeffer and Matt's (2016) study of the university's role in the emergence of the Strasbourg EE. They show the strong impact of the university as a hub organization and argue that the EE matured around that university. Since their research question and data focused on the role of this university in the emergence of the EE, there could also be other subsystems parallel to the EE that they identified. On the basis of these findings, it can be argued that different subsystems within a single EE might promote different types of entrepreneurs and that these subsystems might co-exist, overlap, or influence each other within one region.

(3) Another strand of research—namely, on networks and entrepreneurship—emphasizes the different resource needs of different types of entrepreneurs or new ventures (Elfring and Hulsink 2007; Lockett and Wright 2005; Partanen, Chetty, and Rajala 2014) and in different founding stages (Hite and Hesterly 2001; Larson and Starr 1993; Butler and Hansen 1991). Special emphasis is given to the distinct resource needs of university spin-offs (Wright et al. 2006; Lockett and Wright 2005). These spin-offs originate in the scientific context of a university, where entrepreneurial knowledge is generally not as present and easily available as it is for start-up entrepreneurs in a business environment (Rasmussen, Mosey, and Wright 2015; Vohora, Wright, and Lockett 2004). Like any other entrepreneur, spin-off entrepreneurs need to acquire resources from their EE but are often not that familiar with this context in advance (Maurer and Ebers 2006; Keating, Geiger, and McLoughlin 2014). The initial founding conditions—that is, whether the new ventures spin out of a university, an incubator, or start independently—impact resource acquisition (Elfring and Hulsink 2007). These findings suggest that different types of entrepreneurs—for example, start-up and university spin-off entrepreneurs—might engage differently with the EE, and thus a specific EE might promote different types of entrepreneurs in distinct ways, or—as reasoned above—different subsystems might promote different types of entrepreneurs. To analyze empirically how a specific EE promotes different types of entrepreneurs, we need to understand how these different types of entrepreneurs actually acquire resources from these differently shaped EEs.

2.4 Resourcing entrepreneurial knowledge and financial capital

Mobilizing resources from external actors is one of the most elementary activities that defines the entrepreneurship process (Clough et al. 2019; Macpherson, Herbane, and Jones 2015; Dubini and Aldrich 1991). The fact that these actors and resources are only part of the EE if entrepreneurs actually incorporate them into their resourcing practices moves these resourcing practices to the center of attention. The entrepreneur is not necessarily the most powerful actor in an EE but, by its definition, the concept of EE moves the entrepreneur and his or her entrepreneurial activities to the center of attention (Spigel 2016; Motoyama and Knowlton 2017). While other elements might have functional equivalents, entrepreneurs are indispensable; without entrepreneurs, the supportive infrastructure has no one to support. This paper focuses on two critically important resourcing practices of entrepreneurs: resourcing (1) entrepreneurial knowledge and (2) financial capital.

To start a new venture, knowledge about how to found a business (Aldrich and Yang 2013; Vissa and Chacar 2009; Ruef 2005) and other entrepreneurial knowledge is an essential resource (Isenberg 2011; Spigel and Harrison 2018). Often, entrepreneurial knowledge is exchanged through informal communication between entrepreneurs (Feldman 2001; Aldrich and Yang 2012), which makes other entrepreneurs and mentors crucial actors (Thompson, Purdy, and Ventresca 2018; Motoyama and Knowlton 2017). Successful entrepreneurs often remain part of the ecosystem as serial entrepreneurs, angel investors, or mentors, providing their money and knowledge to the EE, which results in resources circulating in a process of entrepreneurial recycling (Spigel and Harrison 2018; Mason and Harrison 2006; Bahrami and Evans 1995).

Financial capital is often acquired from external actors, for instance, from angel investors or venture capitalists (VCs). Yet the sheer presence of financial capital in an EE might not be enough, as several failed government-backed venture capital and venture support programs have demonstrated (Brown, Mawson, and Mason 2017; Spigel and Harrison 2018). Promoting the wrong entrepreneurs on account of public funding programs applying mistaken evaluation criteria might even harm the ecosystem because of unsuccessful ventures staying in the EE for too long (Isenberg 2011).

Focusing on the resourcing practices of entrepreneurs sheds light on how an EE actually promotes entrepreneurship. Analyzing different types of entrepreneurs promises valuable insights into heterogeneous structures within EEs. There is reason to believe that distinct subsystems might evolve around different types of entrepreneurs. Yet we do not know much about the co-existence and interplay of substructures within EEs.

3. Methods

Given the limited theory and evidence on how an EE promotes different types of entrepreneurs, an embedded single case study promises high potential to generate theoretical insights that might guide future research (Yin 1994). The Berlin EE serves as an exemplary case to theorize about how EEs might promote different types of entrepreneurs. One characteristic of EEs that particularly stands out when focusing on the resourcing practices of entrepreneurs is the *degree of integration*, or the *fragmentation* of an EE as one possible form that this can take.

3.1 Case selection

The present research applied Yin's (1994) embedded single case study design. The cases are at two levels. First, the Berlin EE was treated as a single case and the focus of this analysis. Second, the study looked at multiple entrepreneurs who are embedded in that single case to analyze how the Berlin EE supports different types of entrepreneurs. This was done by focusing on the resourcing practices of entrepreneurs who are embedded in the Berlin EE. Berlin is a very interesting case to analyze how an EE supports different types of entrepreneurs because of its intense political promotion of entrepreneurship and the parallel emergence of an independent entrepreneurial community after Germany's reunion.

Until 1990, the city was divided in East and West Berlin. After the reunion, there were an abundance of opportunities for young, creative people to establish a dynamic culture. Today, Berlin is ranked one of the top three entrepreneurial ecosystems in Europe. For examples, it ranks 3rd behind London and Paris in terms of the number of deals closed with VC firms and ranks 2nd, behind London with respect to the amount of capital invested (Ernst and Young, 2019). It is a metropolitan area with plenty of well-educated, often international young people, has four universities, and boasts affordable, albeit increasing, costs of living. Most of the entrepreneurial activity, especially of innovative, independent start-ups, is locally clustered around two neighboring districts in the heart of Berlin (Mitte and Friedrichshain-Kreuzberg) (BSM 2018).

Since the late 1990s, the German government made strong efforts to promote entrepreneurship at universities, not only in the form of spin-offs that transfer IP from the university but also in

the form of non-IP-based businesses started by students or alumni (Heumann 2010; Kulicke 2014; 2017). As part of that strategy, the Federal Ministry for Economic Affairs and Energy launched a funding program to support university spin-offs.¹ It comprises two funding lines: *Exist Forschungstransfer* (Exist FT) and *Exist Gründerstipendium* (Exist GS). Exist FT focuses on the commercialization of IP and finances teams of up to four entrepreneurs for one and a half years; Exist GS awards scholarships for one year to teams of up to three entrepreneurs that do not transfer IP. A third pillar of this governmental strategy is establishing incubator programs at universities.

The case study of the Berlin EE comprised 29 embedded entrepreneurs. They were theoretically sampled (Eisenhardt 1989; Glaser and Strauss 1967) to cover three types of entrepreneurs, namely, *start-up entrepreneurs*, *university spin-off entrepreneurs*, and *Exist entrepreneurs*. As argued in section 2.4, start-up and university spin-off entrepreneurs might be expected to engage differently with the EE because of their different resource needs and founding backgrounds. The same applies to entrepreneurs who received public funding from Berlin's Exist program.

In contrast to start-ups or spin-offs from companies, university spin-offs transfer IP from a university or research institute to commercialize research results (Vanaelst et al. 2006; Wright et al. 2006; Lockett and Wright 2005). For simplicity, this group will henceforth be called *spin-off entrepreneurs*.

Exist entrepreneurs, the third type of entrepreneur in the Berlin EE, are closely associated with the Exist GS funding line. Their technologies show similar characteristics to the ones start-up entrepreneurs typically develop, but their founding background resembles more that of spin-off entrepreneurs. As a result, their resource needs are comparable to start-up entrepreneurs, but at the outset they face a funding and support infrastructure similar to spin-off entrepreneurs. Hence, this support infrastructure might have a potential imprinting effect on them even though their resource needs are different from spin-off entrepreneurs.

3.2 Data collection

Since the focus of this study is to analyze the supporting role of an EE through the resourcing practices of entrepreneurs, the primary data source was semi-structured interviews with entrepreneurs. Thirteen start-up entrepreneurs, thirteen spin-off entrepreneurs, and three Exist entrepreneurs were theoretically sampled to participate in this study. This data was triangulated with two other sources—interviews with other relevant actors of the EE and observations of entrepreneurship events—to bolster confidence in the accuracy of the emergent theory.²

Thirty-four interviews were conducted with 29 entrepreneurs³ (see table 1).⁴ The interviews were conducted in German⁵ and lasted about one hour on average. All interviews were recorded, transcribed, and entered into the MaxQDA software package, which is specifically designed for qualitative data analysis. The interviews focused on which resources entrepreneurs perceive as important for the founding process and on how and from whom they (tried to) acquire them. All

¹ Between 2007 and 2014, Exist funded 203 new ventures in Berlin (Kulicke 2017). This is an average of 25 new ventures per year. They therefore account for a comparatively small share of entrepreneurs in Berlin.

² Data collection started at the end of 2015 and lasted until mid 2017. Most of the data was collected in 2016.

³ Four start-up entrepreneurs and one Exist entrepreneur were interviewed twice. The second interview was conducted one year after the first one. Three of the 17 interviewed start-up entrepreneurs were involved in the same start-up; two of the 13 interviewed spin-off entrepreneurs were involved in the same spin-off.

⁴ All interview partners were anonymized, using the shortcuts “SU-[letter]” for start-up entrepreneurs, “SO-[letter]” for spin-off entrepreneurs, and “EX-[number]” for Exist entrepreneurs.

⁵ German is the native language of the researcher and the interviewed entrepreneurs. All quotes in this paper were translated into English by the researcher.

interviews were based on the same interview schedule to ensure that differences in the stated resourcing activities were not simply the result of asking different questions. However, to also utilize the advantages of qualitative research—namely, to adapt data collection to new insights—two questions were carefully added after the first few interviews. It became apparent that start-up and spin-off entrepreneurs mentioned different actors whom they approached to acquire similar resources. To determine whether the two groups were not aware of the respective other actors or if and why they consciously decided against them, questions such as “Did you consider to apply for Exist? Why?/Why not?” or “Did you consider angel investors/VCs?” were added at the end. By including them at the end of the interview schedule, these additional questions could not influence the previous course of the interview.

To not only rely on the entrepreneurs’ perceptions but to also gather data on and gain insight into the EE, nine relevant actors from the EE were also interviewed. The research also involved visiting and taking notes at fifteen relevant events, including those hosted by the university’s incubators, big corporations and meet-ups organized entrepreneurs. Special attention was given to who the typical participants visiting different types of events were, who the typical speakers at what type of event were, and what type of entrepreneurs typically visited which type of event.

A qualitative case study must address the issue of potential bias rooted in the mode of data collection. Several measures were taken to do so. First, it involved carefully choosing interview participants. For example, recruiting spin-off entrepreneurs only through a single incubator could have resulted in all of them identifying the same actors as highly relevant or all engaging in similar resourcing practices because of having attended the same courses, thus leading to wrong conclusions about the Berlin EE. To mitigate that risk, entrepreneurs were approached in different, well-considered ways. Although all spin-off entrepreneurs included in the analysis received funding from Exist or an equivalent program, this was not just the outcome of a narrow case selection strategy. Potential interview partners were searched via the websites of two research institutes and the incubators of three universities and at various types of entrepreneurship events.⁶ According to the collected data, only one start-up entrepreneur and one angel investor in the sample knew each other.⁷ Thus, similarities in resourcing activities cannot be attributed to the interview participants’ familiarity. Second, as noted above, the interview guideline was largely the same for all interviews with entrepreneurs, with only a few additional questions carefully added at the end of some interviews. Third, the interviews with the entrepreneurs were triangulated with interviews with other relevant actors of the EE and with observations of different types of entrepreneurship events. Forth, all interview partners were guaranteed anonymity, which can be expected to encourage candor.

--- Insert table 1 about here---

3.3 Data analysis

The analysis began by coding the data. Following Miles, Huberman, and Saldana (2014), this involved two coding cycles to determine patterns across individual resourcing activities (as illustrated in figure 2). The first cycle consisted of inductive process coding to identify the

⁶ To mitigate biases, it is important to include university spin-offs that did not receive Exist funding. I searched for those but found only very few. In the interview, it turned out that those few had also received Exist and just did not mention it on their website.

⁷ The three start-up entrepreneurs and two spin-off entrepreneurs who were involved in the same new venture also knew each other. In this case, including them was a conscious decision to interview two/three entrepreneurs involved in the same new venture (one of each type) in order to analyze differences in their resourcing activities according to their role in the new venture. This was also an element in the attempt to mitigate potential biases. Ultimately, it turned out that those interview partners exhibited rather similar resourcing activities in spite of their different roles within that new venture.

diverse individual resourcing activities of all interviewed entrepreneurs (e.g., whether they applied for or received Exist or EU funding). The second coding cycle served to discover patterns across entrepreneurs. Similar resourcing activities were grouped into a smaller number of resourcing practices in a process of pattern coding (e.g., “*resourcing financial capital from Exist (or equivalent)*”). Similar practices were again grouped into more general practices (e.g., “*resourcing financial capital from Exist (or equivalent)*” and “*resourcing financial capital from public and semi-public investor*” were grouped into “*resourcing financial capital from public and semi-public actors*”).

--- Insert figure 2 about here---

The second step in the analysis involved searching for patterns across all types of entrepreneurs, not just among each type, to be able to identify similar practices across different types. Cross-case analysis mitigates the risk of overemphasizing differences between the pre-defined types of entrepreneurs. Yet despite these efforts to allow for similarity between the three types of entrepreneurs, this analysis identified major differences between start-up and spin-off entrepreneurs, and surprisingly many similarities between spin-off entrepreneurs and Exist entrepreneurs.

The third step was devoted to developing theoretical constructs from the data by contrasting and comparing resourcing practices. Developing the idea of the *fragmentation* of the Berlin EE resulted in a “conceptual leap” (Klag and Langley 2013). How well or poorly this emergent frame of fragmentation fits with the data was assessed in a highly iterative process (Eisenhardt 1989). For example, as the concept of *fragmentation* took shape, special attention was paid to the three Exist entrepreneurs. The goal was to analyze to what extent their resourcing activities show more similarities to start-up or spin-off entrepreneurs, and why. One way to do this was to pair two entrepreneurs—one start-up and one Exist entrepreneur (SU-A and EX-1)—whose products feature especially similar characteristics and compare their resourcing activities in depth (Eisenhardt 1989). This comparison revealed stronger similarities between Exist and spin-off entrepreneurs, even though the resource needs of Exist entrepreneurs are very similar to start-up entrepreneurs. The *degree of integration*, and *fragmentation* as one example of a low degree of integration, emerged as a new theoretical construct.

4. Findings

How does an EE promote different types of entrepreneurs? Or, to put it differently, how can different types of entrepreneurs acquire resources from the EE? In Berlin, the practices for resourcing entrepreneurial knowledge and financial capital differ between start-up entrepreneurs and spin-off entrepreneurs but not so much between spin-off and Exist entrepreneurs. The fragmentation of the Berlin EE becomes especially apparent when we analyze the resourcing practices of entrepreneurs; it is through these different practices that renders the fragmentation of the Berlin EE visible.

4.1 Resourcing entrepreneurial knowledge

The analysis identified six practices for resourcing entrepreneurial knowledge. Some are more relevant than others, but not all entrepreneurs engage in all practices, nor do they do so randomly. Rather, they show patterns, as table 2 illustrates.⁸

--- Insert table 2 about here---

⁸ Since resourcing entrepreneurial knowledge from incubators and accelerators is much less important, this section does not elaborate on these practices. Accelerators and the university’s incubators are two very different types of actors in the Berlin EE. Accelerators are mostly three-month programs offered by private companies. The support programs of the university’s incubators last between 12 and 18 months. The university’s incubators are primarily funded by public funding programs and the university budget.

Start-up entrepreneurs largely gain entrepreneurial knowledge through *informal exchange within the entrepreneurial community* or extensive interaction with a small group of mentors (*gaining entrepreneurial knowledge from mentors*). As table 2 shows, eleven of the interviewed start-up entrepreneurs have or had a mentor, and only entrepreneur SU-J explicitly said that he does not learn much from the entrepreneurial community, except for the exchange with his mentor, who is also a member of this community. This underscores that the entrepreneurial community is a very important source of business advice and mutual education. Five of the interviewed start-up entrepreneurs also worked in a start-up before founding their own one. As one of them explains, he did so precisely to learn about the entrepreneurship process:

“For me it was extremely helpful to have the experience before founding my first start-up. Not to be one hundred percent responsible but to be able to co-decide and experience how to build a company in order to apply this knowledge to my own company.” (SU-H, i-11)

All spin-off and Exist entrepreneurs participated in a university’s incubator or comparable incubator program. These programs strongly shape how and from whom spin-off and Exist entrepreneurs acquire entrepreneurial knowledge. Eleven spin-off entrepreneurs and two Exist entrepreneurs engaged in *informal knowledge exchanges with other entrepreneurs* but apparently with just one or two other spin-off entrepreneurs who often participated in the same incubator program and who were not members of the entrepreneurial community. As part of the incubator program, spin-off entrepreneurs are encouraged to *gain entrepreneurial advice from coaches*. Coaches are quite different from mentors, as will be explained below. Exist provides financial resources specifically earmarked for consulting coaches. The university’s incubator then suggests suitable coaches. As table 2 shows, seven spin-off entrepreneurs and the three Exist entrepreneurs explicitly referred to coaches as a source of entrepreneurial knowledge, all of whom were suggested by the university’s incubator. The incubator also hosts workshops and events. Although neither the workshops nor the events were considered to be very helpful, the events appear to have been the more important source of entrepreneurial knowledge, with five spin-off entrepreneurs evaluating them as somewhat relevant. Although five of the thirteen entrepreneurs expected to gain knowledge from the workshops, only three actually evaluated this knowledge as useful.

At first glance the practices of *informal exchange of entrepreneurial knowledge within the entrepreneurial community* (start-up entrepreneurs) and *with other entrepreneurs* (spin-off and Exist entrepreneurs) as well as *gaining advice from mentors* (start-up entrepreneurs) and *from coaches* (spin-off and Exist entrepreneurs) seem rather similar. But in reality they are different in highly significant ways, especially with respect to the actors of the EE who are important for each of these practices.

The informal knowledge exchange of start-up entrepreneurs is characterized by generalized reciprocity within the entrepreneurial community. This comprises informal learning while working at a start-up as well as frequent exchange with several people within that community. These are mostly other entrepreneurs with diverse levels of experience—first time founders, serial entrepreneurs, or angel investors—who work in a variety of industries. As the quote in table 3 shows, entrepreneur SU-M mentions asking “*20 other entrepreneurs*” (i-17) about their experience in a certain area, which illustrates the wide net they cast to resource entrepreneurial knowledge. In contrast, entrepreneur SO-O points to “*one, two other spin-offs*” (i-19) with whom he communicates and who are not members of the entrepreneurial community. The interviewed spin-off entrepreneurs predominantly exchange entrepreneurial knowledge on a one-on-one basis with a few other entrepreneurs who are in the same founding stage and thus have a similar level of experience. They meet these entrepreneurs mostly in the shared office space provided by the university’s incubator or at one of the events hosted by the latter. Consequently, the university’s incubator and its pre-selection of participants has a strong imprinting effect on whom spin-off entrepreneurs choose to approach for informal knowledge exchange.

--- Insert table 3 about here---

A comparable imprinting effect of the university's incubator on the selection of actors can be identified with regard to resourcing entrepreneurial knowledge from coaches. The public funding program Exist has a dedicated budget for consulting coaches, and the university's incubator recommends specific coaches from a network called B!Gründet. However, none of the interviewed start-up entrepreneurs mentioned coaches as a source of entrepreneurial knowledge. They referred to mentors instead, as table 4 shows. Mentors are mostly more experienced entrepreneurs, who sometimes also invest as angel investors and thus have a high personal interest in the success of the start-up, as opposed to coaches, who get paid by the hour. Mentors pass on their knowledge and their experience because this is 'something you do' according to the rules emphasizing generalized reciprocity within the entrepreneurial community. As a successful start-up entrepreneur and mentor explains, his motivation is to give something back to the community. In expressing this, he highlights generalized reciprocity as a guiding rule:

I really gained a lot from my mentor back in the day. So, I want to give back a little, to this network, this community. (SU-M, i-17)

These four practices of resourcing entrepreneurial knowledge attribute importance to very different types of actors of the EE: while the two dominant resourcing practices of start-up entrepreneurs emphasize the importance of the entrepreneurial community, the two dominant practices among spin-off and Exist entrepreneurs attribute a key role to the university's incubator.

--- Insert table 4 about here---

4. 2 Resourcing financial capital

As table 2 shows, two dominant practices of resourcing financial capital can be identified: *resourcing financial capital (1) from private investors* and *(2) from public or semi-public actors*. Each practice (re-)produces certain resourcing trajectories. While start-up entrepreneurs predominantly engage in the former practice, spin-off and Exist entrepreneurs foremost engage in the latter one. Entrepreneurs can switch between the resourcing trajectories that result from each of these practices, although this comes with several challenges.

The general resourcing practice of start-up entrepreneurs' of "*acquiring funding from private investors*" comprises the resourcing practices "*acquiring funding from angel investors*" and "*acquiring funding from VCs*." Seven of the analyzed start-up entrepreneurs acquired angel investments for their start-up, and two were negotiating such an investment at the time of the interview. Six start-up entrepreneurs already knew their angel investor before founding their first start-up because they were members of the entrepreneurial community beforehand, as shown in table 2. The initial angel investor(s) connect(s) the entrepreneurs with other interested angel investors, or later on, with VCs (*finding investors via personal connections in the entrepreneurial community*). For follow-up financing, VCs become more important. Three start-up entrepreneurs already acquired VC investment for their start-ups; the founders of the other eight start-ups negotiated with VCs or planned to do so in the near future. Contacts with potential VCs are often established through angel investors or current VCs ("*contacting the second investor(s) through the first*"), as shown in table 5. Personal connections within the entrepreneurial community are important for both practices. Consequently, the entrepreneurial community plays a key role in resourcing financial capital.

--- Insert table 5 about here---

By contrast, spin-off entrepreneurs acquire financial capital predominantly from public or semi-public actors. During their early founding stages, all spin-off and Exist entrepreneurs received funding from Exist or comparable public funding programs ("*acquiring funding from Exist*"). As a spin-off entrepreneur explains, the following is the typical path pursued:

"We did what you do with technological ideas. We tried to get it financed by Exist." (SO-Y, i-29)

During the later stages, spin-off entrepreneurs mostly acquire financial resources from public and semi-public investors. Four spin-off entrepreneurs received investments from public or semi-public investors, two received funding from a mix of semi-public and strategic investors, and five negotiated with public or semi-public investors. At this point, the networking events organized by the university's incubator have typically already introduced these actors to each other, thereby communicating the resourcing practice of *acquiring funding from public investors* and, in doing so, strengthening it. Spin-off entrepreneurs thus learn that this is the primary path for follow-up financing.

After having received funding from Exist, two of the three Exist entrepreneurs tried to move from the *public funding trajectory* to the *private investment trajectory* and acquire financial resources from private investors. The third Exist entrepreneur (EX-3) acquired funding from a public investor after being funded by Exist, and only afterwards switched to the private investment trajectory. While the first two failed, the later one managed to switch trajectories. Why does it seem to be rather difficult to switch?

This is where the *fragmentation* of the Berlin EE into—at least—two subsystems has an impact. Because each subsystem has different rules and resources, the resourcing practices of one subsystem cannot be readily transferred to the other subsystem. Once entrepreneurs are embedded in one of the subsystems, it becomes rather difficult for them to acquire resources from the other.

4.3 The fragmentation of the Berlin EE

The analysis of their resourcing practices showed that each type of entrepreneur chose different types of actors in the EE to acquire similar resources. As illustrated on the left side of figure 3, the entrepreneurial community is highly important for start-up entrepreneurs, not only to acquire entrepreneurial knowledge but also for financial capital. As table 2 and 5 show, the key actors for acquiring financial capital—angel investors and VCs—are in most cases contacted via the entrepreneurial community. Spin-off and Exist entrepreneurs mostly gain knowledge from a few other entrepreneurs from the same incubator program and from coaches and also—although less relevant—at events hosted by the university's incubator. For funding, the public funding program Exist is especially relevant during the early founding stages, whereas later public and semi-public investors become more important, as the right side of figure 3 shows. This demonstrates quite clearly that only some of the actors of the EE are relevant for each type of entrepreneur. It points to one of the defining characteristics of the Berlin EE: its *fragmentation* into two subsystems. The Berlin EE looks differently from the perspective of start-up entrepreneurs than it does from the perspective of spin-off and Exist entrepreneurs. While the different types of entrepreneurs attribute importance to different types of actors in the EE, they still recognize the others, as shown in figure 3 and outlined below.

--- Insert figure 3 about here---

Entrepreneurs do not just randomly choose to approach a specific type of actor (e.g., mentors or coaches) to gain entrepreneurial knowledge, but they do so because the rules of the subsystem legitimize a specific type of actor as the appropriate one to approach for this purpose. The following comment by the head of an accelerator shows that he does not see coaches as a legitimate choice to learn about entrepreneurship:

“...a lot of them [coaches] talk about founding like a blind man about colors, due to their lack of experience and due to a lack of incentives because they do not have any stake in this game. [...] Working for a university's incubator is very different. Nobody joins them voluntarily as a mentor. This is why they have to choose paid coaches.” (Mentor, angel investor, and head of an accelerator, i-36)

This emphasizes two aspects. First, the actors of each subsystem do recognize the others. Second, they do not attribute legitimacy to the same type of actor for providing similar resources.

Despite attributing far more relevance to the entrepreneurial community, to angel investors, and to VCs, start-up entrepreneurs do also recognize the actors who are relevant to spin-off entrepreneurs, but they consider them to be much less important for themselves and often only refer to them to distinguish themselves from spin-off entrepreneurs. Spin-off entrepreneurs do the same with regard to start-up entrepreneurs and actors from the start-up subsystem. This becomes especially apparent in their evaluation of the role of the entrepreneurial community, as demonstrated in table 6. While start-up entrepreneurs attribute very high importance to the entrepreneurial community and consciously decide to rent office space in the heart of the start-up scene (around Rosenthaler Platz), spin-off entrepreneurs do not want to be involved with this environment since they do not identify themselves as the same kind of entrepreneur. As one of the spin-off entrepreneurs describes it, he does not feel as if he belongs there (SO-O, i-19, table 7).

--- Insert table 6 about here---

Both types of entrepreneurs do not only perceive the actors of the other subsystem, they also perceive them as being involved in a different subsystem and consciously refer to the fragmentation of the Berlin EE. Or in their words: “*two worlds that clash*” and the “*second Berlin start-up community, the more private-sector community*” (SU-K, i-15); “*here, in the real world*” (SU-B, i-4) or “*this other start-up scene*” (SO-Z, i-30). This fragmentation—and the different rules that legitimize different actors and resources as appropriate in the respective setting—make it difficult to switch trajectories and acquire resources from the other subsystem.

4.4 Switching between subsystems: How the fragmentation of the EE enables and constrains resourcing practices

This fragmentation into two subsystems strongly impacts the resourcing practices of entrepreneurs and thus how the EE promotes different types of entrepreneurs. By starting in one of the two subsystems, entrepreneurs enter one of the two dominant resourcing trajectories. Switching from one trajectory to the other is inhibited by the fragmentation of the EE. The interviews testify to the difficulties of transferring the resourcing practices of one system to the other.

As mentioned above, two of the three Exist entrepreneurs struggled to find follow-up financing. The typical public and semi-public investors for follow-up financing of spin-offs mostly invest in new ventures that rely on IP. Thus, they are not a very good fit for Exist entrepreneurs. Entrepreneur EX-1 tried to acquire angel investment by writing cold emails to angel investors whom he identified through lists on the Internet. This is not compatible with the dominant resourcing practice of the start-up subsystem, which is to acquire angel investment via personal connections within the entrepreneurial community. Angel investors predominantly recognize entrepreneurs via their personal network within the entrepreneurial community, and consequently they only rarely recognize entrepreneurs who are not members. Angel investors also strategically build relationships for their investments, for example, with potential VCs. They anticipate the resourcing practices of the start-up subsystem and help those entrepreneurs to acquire financial capital according to the legitimate practices of the EE. Thus, in addition to financial capital, angel investors and VCs also provide access to their network and in so doing reproduce the resourcing practices of using personal connections and finding the second investor through the first:

“We also consciously try to network very intensively with people who we don’t know yet. Because it is always useful to know some people in the investment business in case one of our portfolio start-ups needs follow-up financing. So, we try to stay in touch with several VCs.” (Angel investor, i-37)

This again points to the key role of the entrepreneurial community in the start-up subsystem. Not being a member becomes a problem once spin-off or Exist entrepreneurs seek to acquire resources from the start-up subsystem. And as argued above and illustrated in table 6, spin-off and Exist entrepreneurs consciously decide not to get involved with this community. In contrast, start-up entrepreneurs emphasize the high importance of being a member and make a

considerable effort to become one. Closure of the subsystem—and thus a solidification of the resourcing trajectories—is promoted by the key role that personal relationships within the entrepreneurial community play in resourcing in this subsystem.

Furthermore, the resourcing trajectories are solidified because investors expect different quality signals in each subsystem. Receiving funding from Exist is considered a quality signal by public and semi-public investors. By contrast, the rules of the start-up subsystem legitimize investment from a successful angel investor or well-regarded VC as a quality signal—indicating that somebody with business expertise evaluated their skills, their team, and trusted them with his or her money. In that subsystem, having received Exist funding does not qualify to the same degree. To acquire Exist, entrepreneurs have to write a comprehensive application, and the decision on funding is predominantly based on this application. In the start-up subsystem, having received Exist funding only indicates the ability to write successful applications or find a university incubator that helps one do so:

“They do not even evaluate your competencies as an entrepreneur. The only skills they evaluate are your competencies in finding a university incubator that knows how to write Exist applications.” (Start-up entrepreneur, SU-D, i-6)

As an angel investor explains, Exist entrepreneurs are not very well regarded in the start-up subsystem. They have to convince him that they have a good idea and a good team *“even though they received Exist”* (i-36). Actors from the spin-off subsystem even recognize these differing evaluation criteria of VCs:

“Many people who are not involved in public funding did see it as a malus when entrepreneurs received public funding. So we tried to mediate, for example, by cooperating with them and saying: ‘Hey, it is totally okay to take public money!’” (Employee of a body that provides public funding, i-38)

These different resourcing trajectories are additionally reinforced by the entrepreneurial education provided by the university’s incubators. They present the bodies that provide public and semi-public investment as the first choice for acquiring follow-up funding. The start-up entrepreneur who also acquired Exist funding was wondering why the university’s incubator always just invited these investors to its events:

“At these spin-off events—where you can showcase a little—they have the usual, more public-sector suspects, like the [two semi-public investors] but not so much the actual early-stage investors and angel investors. Those are in the second Berlin start-up community, in the more private-sector community. They [the organizers of the spin-off events] seem to ignore this community.” (SU-K, i-15)

4.5 Other actors in the EE also refer to its fragmentation

Since this study focused on three types of entrepreneurs, there might be more than the two subsystems in the Berlin EE. Although this is conceivable, the data indicates that the two subsystems identified are the dominant ones because (1) both types of entrepreneurs refer to each other and this fragmentation, but neither to other types of entrepreneurs nor to any other types of actors in the EE and (2) the other actors of the EE also—and only—refer to the fragmentation between these two subsystems. This is further underscored by the fact that there were no indications of additional subsystems at any of the observed entrepreneurship events either.

The other actors in the EE also recognize and sometimes interact with each other but not as frequently as with the actors in their subsystems. Their practices are predominantly shaped by the rules and resources of their respective subsystem in the EE. Similar to the entrepreneurs, they also refer to the EE’s fragmentation.

A mentor and angel investor strongly criticizes the German government in building up a parallel funding structure using tax money to undermine the market mechanisms in the EE. By referring to these types of actors as *“doing their parallel thing”* (i-36), he makes express mention of the fragmentation of the Berlin EE. He distinguishes start-up events and private investors as *“the real events”* and *“the real investors”* (i-36) from the events hosted by the university’s incubators

and public funding programs. He emphasizes that the public actors think and act in different time horizons and have different networks, pointing to the different rules within each subsystem:

“Everything takes much longer and the networks are also different ones. This holds true for both sides. Even those university people who specialize in innovation and start-ups do not have many connections with the Berlin start-up community. They don’t come to our events. I don’t want to say that I don’t take them seriously. You don’t even get the chance to take them seriously.” (Mentor and angel investor, i-36)

Actors in the spin-off subsystem predominantly interact with each other. The university’s incubators closely collaborate with each other and with public and semi-public investors. Since the interviewees explicitly address this division between the spin-off and the start-up community (e.g., the “*separation between private equity and public equity*” (i-38)), it becomes obvious that the actors involved with public funding are also aware of the fragmentation and even of the different evaluation criteria of VCs, as outlined above.

Actors from the spin-off subsystem increasingly try to engage with the start-up subsystem. Since this is not the main focus of their work, however, closer connections are slow to emerge. Some VCs have started to adapt their expectations or evaluation criteria in favor of Exist entrepreneurs. This might indicate an increasing intertwinement of both subsystems:

“Nowadays, the investors know: okay, money from Exist, that is not one euro for one euro. You have to discount it a bit because you can’t finance certain things due to bureaucracy.” (SU-K, i-15)

Since the university has begun to reach out to the start-up subsystem, joint events between these two worlds are becoming more frequent. As start-up entrepreneur SU-B notes, the university’s incubators increasingly invite guest speakers from the start-up subsystem, which he considers to be very important:

“Universities try to address that, and I like it. They stage events like the one last week, where they invite private-sector people who explain how the real world works. That is a must.” (SU-B, i-4)

Yet the interviewee referring to the start-up subsystem as “*the real world*” (i-4) again shows that different types of actors in the Berlin EE are aware of its fragmentation. Although some actors from the spin-off subsystem actively try to bridge this division by interacting with private actors, these efforts are only slowly reflected in the resourcing practices of the three types of entrepreneurs. Thus, the two distinct subsystems persist; they are constituted and reproduced by the different resourcing trajectories of the different types of entrepreneurs.

5. Discussion

To understand how different EEs promote different types of entrepreneurs, it is necessary to look at how entrepreneurs actually make use of resources and identify relevant characteristics of EEs that impact the functioning of these ecosystems. The primary contribution of this study is an emerging theoretical understanding of how a certain structural characteristic—namely the *fragmentation* of an EE—impacts how an EE promotes entrepreneurship.

5.1 The integration of EEs

This paper contributes to the research on entrepreneurial ecosystems by developing a new concept: the *integration* of an EE. The analysis of how entrepreneurs actually acquire resources from the Berlin EE revealed a defining characteristic of this EE: its *fragmentation*. With respect to previous research on EEs in different regions, it can be assumed that a fragmentation of this kind might, but does not necessarily have to, occur in other EEs. Silicon Valley, for example, seems to be characterized by a very high integration of the EE. From Silicon Valley’s very early days on, Stanford University has been tightly intertwined with established corporations, new ventures, and private investors (Saxenian 1996; Gibbons 2000). Its faculty members are strongly involved in new ventures and entrepreneurship in general (Kenney and Goe 2004). VCs play a key role in connecting the entire EE (Ferrary and Granovetter 2009; Hellmann 2000;

Banatao and Fong 2000). If we consider the findings from this paper in light of previous research, we can theorize that EEs can display different *degrees of integration*, that is, they can be highly integrated, fragmented, or something in between.

How and from whom an entrepreneur can acquire which resources is enabled and constrained by the extent to which certain actors share practices and refer to the same rules, and different subsystems can be characterized by different rules. In Berlin, this became apparent in how start-up entrepreneurs on the one hand and spin-off and Exist entrepreneurs on the other distinguish themselves from the respective other type. While start-up entrepreneurs actively try to become a member of the entrepreneurial community, spin-off and Exist entrepreneurs do not identify themselves as that kind of entrepreneur.

Fragmentation limits the range of actors an entrepreneur can reach with certain resourcing activities and thus has a strong impact on how an EE promotes different types of entrepreneurs. In the Berlin EE, angel investors are primarily approached via personal relationships within the entrepreneurial community. Consequently, they are largely out of the reach of spin-off and Exist entrepreneurs, who are mostly not a member of the entrepreneurial community. Due to the EE's fragmentation, angel investors primarily support only one type of entrepreneur: the start-up entrepreneur.

Proposition 1: The degree of integration impacts how an EE promotes different types of entrepreneurs. In a more integrated EE, different types of entrepreneurs can access similar resources through similar actors and consequently have easier access to more and more manifold resources of the EE.

This fragmentation might occur along different dimensions—for instance, private versus public, as in the case of the Berlin EE—or between different industries. For example, Spigel (2017) identified a strong impact of the gas and oil industry on Calgary's EE. It might be possible that a strong impact of one industry might also promote the structuration of a distinct subsystem within an existing EE, but it does not necessarily have to (Feldman 2001).

5. 2 Different types of actors promote different types of entrepreneurship

Previous research has identified several actors as relevant to successful entrepreneurship (Isenberg 2011; Spigel 2017; Alvedalen and Boschma 2017). As this paper has shown, only some of these actors might be relevant for certain types of entrepreneurs. Several studies and conceptual frameworks emphasize the crucial role of universities (Saxenian 1996; Gibbons 2000; Schaeffer and Matt 2016). In Berlin, universities are foremost relevant in the spin-off subsystem. Although most start-up entrepreneurs are academics, many of them studied at universities all over Germany and have come to Berlin either to work at a start-up or to start their venture. The literature also emphasizes the importance of entrepreneurial recycling (Bahrami and Evans 1995; Mason and Harrison 2006). Cashed-out and current entrepreneurs become angel investors (Mason and Brown 2014), resources circulate in the EE, and mutual learning is key (Spigel and Harrison 2018). In Berlin, these processes can only be found in the start-up subsystem. None of the spin-off entrepreneurs founded a new venture before or mentored others, and only a few had a mentor themselves. Coaches and events hosted by the university's incubator serve as functional equivalents to mentor support. Thus, an entrepreneurial ecosystem in a specific region is not necessarily a homogenous environment for all entrepreneurs, as previous research has implicitly assumed (Audretsch and Belitski 2017; Autio et al. 2018; Mack and Mayer 2016). As a consequence, not all actors in one EE will necessarily be accessible and relevant to all kinds of entrepreneurs. If and how they can access resources depends not only on their ability and willingness to engage with the EE (Spigel and Harrison 2018; Brush et al. 2018) but also on the degree of integration of that EE and the extent to which their practices are compatible with the rules and resources of the respective (sub-)system.

Proposition 2A: The degree of integration of the EE impacts how entrepreneurs (can) acquire resources from the EE. The more fragmented the EE, the greater are the differences between the resourcing practices of different types of entrepreneurs.

Consequently, certain actors might be absent in each of the subsystems (Mack and Mayer 2016), but their function might be fulfilled by others. All three types of entrepreneurs considered in the present study manage to acquire entrepreneurial knowledge and financial capital, yet they do so by engaging with different types of actors. In Berlin, angel investors and the public funding program Exist both provide financial capital. Thus, they act as functional equivalents in terms of providing financial capital to different types of entrepreneurs.

Proposition 2B: Different types of actors can provide comparable resources. If certain actors are missing in an EE or subsystem, functional equivalents might fulfill their functions.

To analyze the consequences of missing elements, future research might benefit from comparing how and from whom entrepreneurs acquire similar types of resources. To do so, one might compare different types of entrepreneurs within a single EE or similar types of entrepreneurs in different EEs.

5.3 Heterogeneous resourcing trajectories (re-)produce the fragmentation of an EE

Although at first glance it might appear as if the three analyzed types of entrepreneurs are part of the same EE, they cannot move freely between the two subsystems since both subsystems have different resourcing practices, rules, and resources. This became especially apparent in the case of Exist entrepreneur EX-1, who was embedded in the spin-off subsystem and then tried to obtain angel investment by writing cold emails. Since access to angel investment is usually gained via pre-existing personal relationships within the entrepreneurial community and angel investors in the Berlin EE typically do not perceive Exist as a legitimate quality signal, he was not able to tap investment from the start-up subsystem.

The rules and resources of each subsystem enable and constrain the actions of each type of entrepreneur. Consequently, being embedded in one of the subsystems during the early founding stages creates paths for future resourcing. From a structurationist perspective, we can expect successful practices to be reproduced within each subsystem, thus strengthening its respective rules and resources, binding actors to one of the subsystems, and reproducing the fragmentation of the EE.

Proposition 3A: Heterogeneous resourcing trajectories (re-)produce fragmentation, and fragmentation (re-)produces heterogeneous resourcing trajectories. The stronger the fragmentation, the greater is the closure of each subsystem and the stronger are the trajectories. Strong resourcing trajectories hinder resource acquisition from the other subsystem(s).

As previous research on networks and entrepreneurship has emphasized, different resource needs cause different network structures (Partanen, Chetty, and Rajala 2014; Hite and Hesterly 2001; Lechner and Dowling 2003). But in this case, different resource needs do not sufficiently explain the heterogeneity of the resourcing practices because Exist entrepreneurs show similar practices to spin-off entrepreneurs, yet they develop technologies with characteristics similar to start-up entrepreneurs. These differences are (re-)produced by the fragmentation of the EE. Thus, the initial founding conditions appear to have a stronger impact on the resourcing practices than the resource needs.

Proposition 3B: The stronger the fragmentation of an EE, the stronger is the imprinting effect of the initial founding conditions.

5.4 The parallelism of emergence and design

In some instances, EEs are the product of top-down policies. In these cases, policy makers are typically identified as important actors in the constitution of an EE (Spigel 2016; Mason and Brown 2014; Isenberg 2011). In other cases, EEs evolve in bottom-up processes. In these instances, entrepreneurs are generally attributed greater power in shaping such EEs (Thompson, Purdy, and Ventresca 2018; Feldman 2001). If we assume this pattern to hold for structural reasons and look at the Berlin EE from this angle, we might interpret the prominence of particular groups as a sign of the nature of a subsystem.

What we observe in the Berlin case is that entrepreneurs, serial entrepreneurs, angel investors, and the entrepreneurial community play a key role in the start-up subsystem. In light of the stated pattern, it can therefore be hypothesized that this subsystem might have evolved in a bottom-up process. In the Berlin spin-off subsystem, by contrast, public actors and funding programs implemented by policy makers play a central part, suggesting that this subsystem may have emerged in a top-down process. Seen from the vantage point of a structurationist approach, this suggests that an EE does not necessarily emerge in either a top-down or bottom-up process but that both processes can proceed in parallel, leading to the evolution of distinct subsystems. Heterogeneous and equifinal practices can thus lead to the structuration of subsystems. When a new actor enters the EE (e.g., a semi-public investor from a political initiative), he might change the rules and resources but also could establish new ones that exist in parallel to the old ones. Spigel and Harrison (2018) propose that the proper role of the state is to cultivate an entrepreneurial community and culture that will eventually help produce and reproduce the resources necessary for entrepreneurs. This paper adds to their propositions by emphasizing that, although this might be a fruitful way to support entrepreneurship, there is also a chance that such political promotion could contribute to the fragmentation of an EE and thus to the constitution of distinct subsystems, especially if the political efforts are not well integrated in the emerging entrepreneurial community (Brown, Mawson, and Mason 2017).

Proposition 4: The parallel occurrence of ecosystem emergence and design contributes to the fragmentation of an EE if political initiatives are not well integrated in the entrepreneurial community and do not adequately address the needs of entrepreneurs.

5.5 Scope conditions and research implications

Previous research has shown that there are heterogeneous structures across EEs but has so far failed to develop suitable criteria for comparing EEs other than in terms of their success. This paper proposes that EEs can have different *degrees of integration*, and the Berlin EE is an example of a fragmented one. In this case, its fragmentation occurs along the division of private and public actors. By contrast, Silicon Valley might be a good example of a highly integrated EE. More comparative research is needed to elaborate on the forms and effects of different degrees of integration. Comparing different types of entrepreneurs in an EE promises valuable insights regarding the co-existence of different subsystems within a single EE. Comparing EEs in different regions sheds light on the conditions under which certain forms of integration or fragmentation occur and how they impact the supportive effect of EEs.

More longitudinal research can be expected to contribute to a more differentiated understanding of how the relationships of distinct subsystems can change over time and how a fragmented EE can become an integrated one.

The identification of distinct subsystems within the Berlin EE also raises important questions about case selection. Searching interview partners solely through the incubator of a single university, which is quite common in entrepreneurship research (Chalmers and Shaw 2015; Forbes et al. 2006), increases the risk of overlooking subsystems that might exist in parallel.

6. Conclusions

To understand how EEs promote entrepreneurship, it is necessary to have a closer look at how entrepreneurs actually acquire resources from an EE. Adopting a structurationist approach revealed that not only the relationships and interdependencies between the actors of the EE but also shared rules enable and inhibit resource acquisition from certain actors in certain ways. While prior research has mainly taken an outside perspective and conceptualized the EE as a homogenous environment, the analysis presented here has demonstrated that future research should not only continue to analyze heterogeneity *between* EEs but also *within* EEs and pay more attention to how entrepreneurs actually (can) acquire resources from the respective—more or less integrated and thus more or less homogeneous—environment.

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Figure 1: Resourcing activities, resourcing practices, and structure of the EE

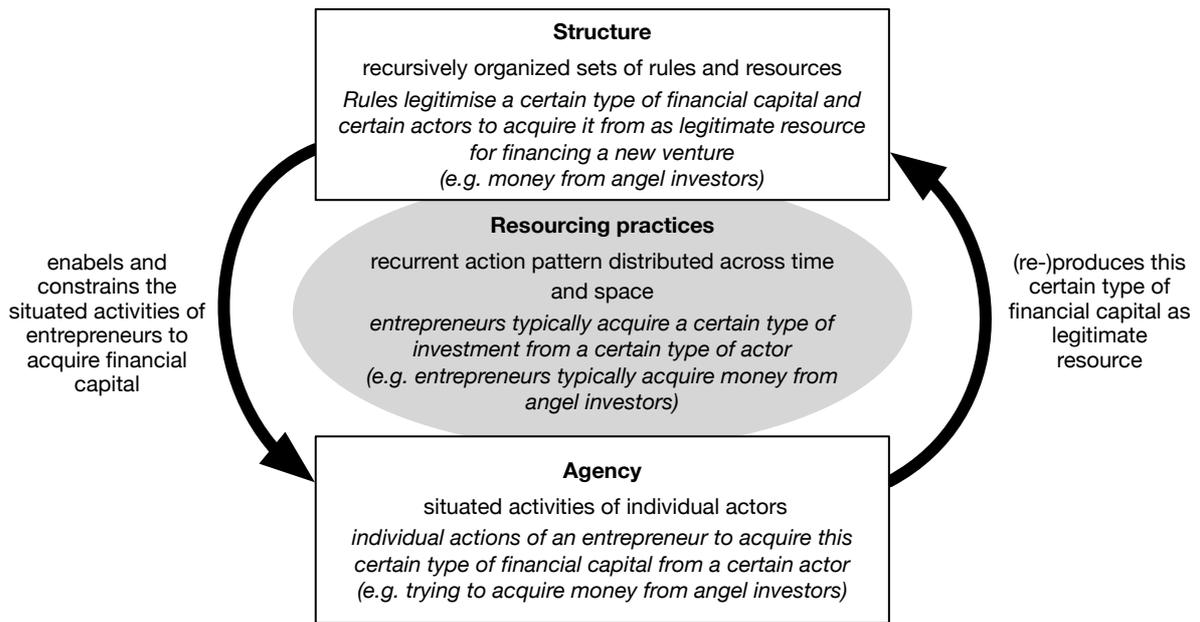


Figure 2: Coding process

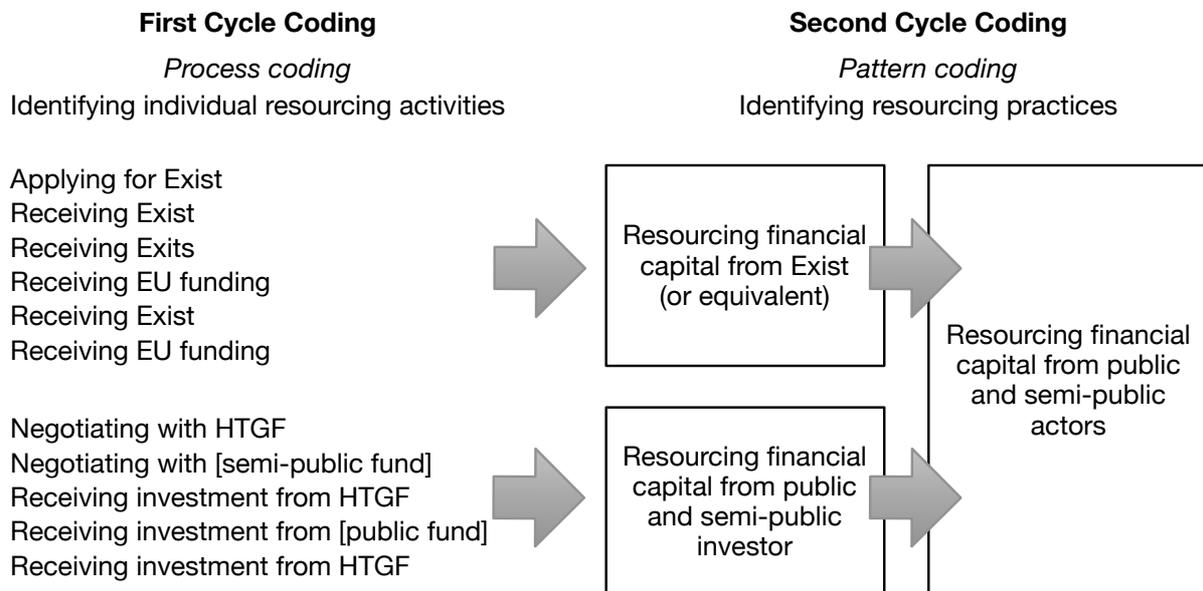
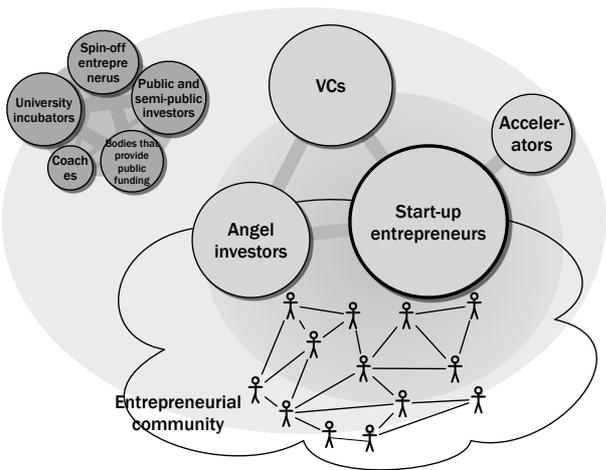
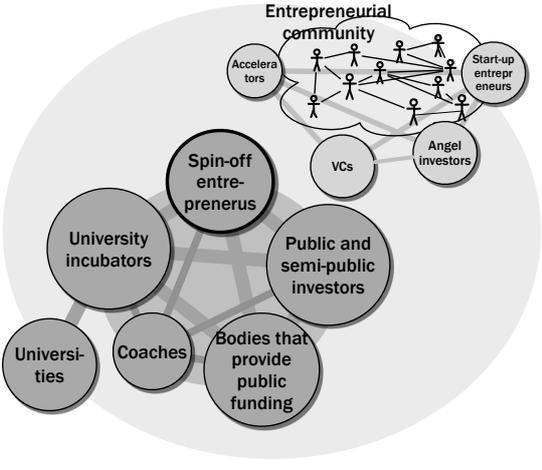


Figure 3: The Berlin EE from different perspectives



The Berlin EE from the perspective of start-up entrepreneurs



The Berlin EE from the perspective of spin-off and Exist-entrepreneurs

Table 1: Data

Entrepreneur	Previous career	IP/no IP	Industry	Position	Age of new venture	Interview number
SU-A	employee/start-up	no IP	consumer electronics	CMO	1 year	i-1
					2 years	i-2
SU-B	employee/corporate	no IP	online platform	CEO	1 year	i-3
					2 years	i-4
SU-C	employee/start-up	no IP	online platform	CTO	1 year	i-5
SU-D	student	no IP	online platform	CEO	2 years	i-6
SU-E	entrepreneur	no IP	SaaS	CEO	1.5 years	i-7
					2.5 years	i-8
SU-F	entrepreneur	no IP	SaaS	COO	1.5 years	i-9
SU-G	employee/corporate	no IP	SaaS	CTO	1.5 years	i-10
SU-H	employee/start-up	no IP	e-commerce	CEO	2 years	i-11
SU-I	entrepreneur	no IP	e-commerce	CEO	1.5 years	i-12
SU-J	entrepreneur	no IP	fintech	CTO	2 years	i-13
					3 years	i-14
SU-K	entrepreneur	IP	SaaS	CEO	1.5 years	i-15
SU-L	employee/start-up	no IP	e-commerce	CEO	6 years	i-16
SU-M	employee/start-up	no IP	e-commerce	CEO	5 years	i-17
SO-N	student	IP	consumer electronics	CTO	1 year	i-18
SO-O	student	IP	SaaS	CEO	1 year	i-19
SO-P	employee/corporate	IP	fintech	CEO	2 years	i-20
SO-Q	researcher	IP	physics	CEO	2 years	i-21
SO-R	researcher	IP	SaaS	CTO	1.5 years	i-22
SO-S	researcher	IP	physics	CTO	1 year	i-23
SO-T	researcher	IP	physics	CEO	1 year	i-24
SO-U	employee/corporate	IP	physics	CEO	2 years	i-25
SO-V	researcher	IP	app	CEO	2 years	i-26
SO-W	researcher	IP	agriculture	CTO	3 years	i-27
SO-X	researcher	IP	SaaS	CEO	4 years	i-28
SO-Y	researcher	IP	physics	CEO	5 years	i-29
SO-Z	researcher	IP	chemistry	CTO	5 years	i-30
EX-1	student	no IP	consumer electronics		1 year	i-31
					2 years	i-32
EX-2	student	no IP	agriculture		1.5 years	i-33
EX-3	student	no IP	app		6 years	i-34

34 interviews with 29 entrepreneurs (total of 33 hours and 51 minutes)

Interviews with other actors: 9 (total of 6 hours and 16 minutes)

(angel investors, head of accelerator, public and semi-public investors, coaches)

Total number of Interviews: 43 Interviews (40 hours and 7 minutes)

Table 3: Informal exchange of entrepreneurial knowledge within the entrepreneurial community vs. with other entrepreneurs

Start-up entrepreneurs	Spin-off entrepreneurs
<p>Informal exchange of entrepreneurial knowledge within the entrepreneurial community</p> <ul style="list-style-type: none"> • With many other entrepreneurs with different levels of experience • Guided by generalized reciprocity 	<p>Informal exchange of entrepreneurial knowledge with other entrepreneurs</p> <ul style="list-style-type: none"> • Only a few other entrepreneurs with a similar level of experience • Guided by direct reciprocity
<p><i>“(After founding one successful start-up), we know all the other entrepreneurs in Berlin and were able to learn from their experiences. Let’s say, we have only little experience in hiring employees who work in IT. We would just ask 20 other people how they hired their developers”.</i> (SU-M, i-17)</p> <p><i>“You know, we help each other. This is a general requirement within the entrepreneurial community. You always also think about the others, make introductions, give feedback, and so on.”</i> (SU-D, i-6)</p> <p><i>“All my friends are entrepreneurs or other people involved with entrepreneurship. So if I need to know something about product design, I just ask of my friends who are designers.”</i> (SU-I, i-12)</p>	<p><i>“I have one other spin-off, no, two other spin-offs, with whom I communicate a lot because we know each other, and I can simply ask: ‘How did you do it?’”</i> (SO-O, i-19)</p> <p><i>“We shared an office with [another spin-off] when we participated in this incubator program. I still talk with them rather often. We talk about possible ways of funding, and so on.”</i> (SO-Q, i-21)</p> <hr/> <p style="text-align: center;">Exist entrepreneurs</p> <p><i>“Here, in this incubator, there are a couple of other spin-offs with whom I chat a lot. You just start chatting and ask: ‘How did you do that? What did you do first? What came next?’”</i> (EX-1, i-31)</p>

Table 4: Gaining entrepreneurial advice from mentors vs. from coaches

Start-up entrepreneurs	Spin-off entrepreneurs
<p>Gained entrepreneurial knowledge from mentors</p> <ul style="list-style-type: none"> • More experienced entrepreneurs • Motivated to help less experienced entrepreneurs because of generalized reciprocity 	<p>Gained entrepreneurial knowledge from coaches</p> <ul style="list-style-type: none"> • Do not necessarily have entrepreneurial experiences • Get paid
<p><i>“It was really cool: our mentor founded a start-up with a similar business model two or three years before we started. So he already experienced all the things that we went through, because he dealt with the same stuff two years before we did.” (SU-M, i-17)</i></p> <p><i>“Most mentors have been entrepreneurs themselves. They made an exit, now they are VCs, or just do something, thinking about ideas, and they just like to help other entrepreneurs.” (SU-B, i-3)</i></p> <p><i>“He is one of our five mentors who help us just out of passion. These mentors came from my contacts, my co-founder’s contacts. They help us because they are passionate about this entrepreneurial community. (SU-A, i-1)</i></p>	<p><i>“Within this Exist program, there is a network called ‘B!Gründet’, and of course, we got some coaches from this network.” (SO-R, i-22)</i></p> <p><i>“Yes, we also participated in coaching sessions. For example from “B!Gründet.” We got a coach from there. You know, we had several coaches whom we paid for coaching us, and we had very mixed experiences.” (SO-W, i-27)</i></p> <hr style="border-top: 1px dashed black;"/> <p style="text-align: center;">Exist-Entrepreneurs</p> <p><i>“We participated in two, three coaching sessions. We searched a coach for a certain topic via the network of the university incubator’s network. Then we met with him and he explained something to us. This was okay, but I mean it should be okay, since we paid him for that.” (EX-1, i-31)</i></p>

Table 5: Resourcing of financial capital from private investors

Start-up entrepreneurs: Resourcing of financial capital from private investors

<ul style="list-style-type: none"> • Acquired funding from angel investors • Knew the angel investor before due to being a member of the entrepreneurial community 	<p><i>“I worked at a start-up before founding my own. I knew [Tim] from there, and he became then invested as an angel in my start-up.” (SU-M, i-17)</i></p> <p><i>“One of our angels was my former boss, from when I worked at [a start-up]. And some others invested, too. They all came from my network and from introductions. Networking is key.” (SU-H, i-11)</i></p> <p><i>“I found the angels in my network. I knew [Thomas] from my previous start-up, I worked with him during that time. So when I started my new company, I just asked him.” (SU-K, i-15)</i></p> <p><i>“We worked at start-ups before. One of our angel investors had invested in this start-up, so we knew him.” (SU-C, i-5)</i></p> <p><i>“We found our angel investor via one of our mentors. Our mentor knew angels, and these angels knew more angels, so some of them joined and invested with him.” (SU-A, i-1)</i></p>
<ul style="list-style-type: none"> • acquiring funding from VCs • contacting the second investor(s) through the first (or personal network) 	<p><i>“We made a list with about one hundred investors that might be interesting to us. Then we checked how we could reach them. We had a look at LinkedIn if we were somehow connected, and who of our connections could make the strongest intro.” (SU-C, i-5)</i></p> <p><i>“In the first round, we already received funding from well-regarded investors with really good connections. They introduced us to potential follow-up investors, with whom we negotiated. After two months, we secured follow-up investment.” (SU-E, i-8)</i></p> <p><i>“I approach them mostly via intros from my network. For example, I asked one of our investors: ‘Can you introduce me to this and that VC?’” (SU-M, i-17)</i></p>

Table 6: The role of the entrepreneurial community

Start-up entrepreneurs	Spin-off entrepreneurs
<p><i>“It would have been more difficult in another city, because I would not have had such a circle of friends who are all involved in entrepreneurship or work in Internet-related industries. And then I would not have had the access to all these people’s knowledge that I have here.” (SU-I, i-12)</i></p>	<p><i>“These are completely different scenes. And to be honest, every time I get involved with this other scene, I’m mostly just annoyed. I do not like it there so much.” (SO-Z, i-30)</i></p>
<p><i>“You should not underestimate the effect of having an office here [in the center of the start-up scene]. It is really cool to be able just to meet anyone spontaneously. It’s just a ten-minute bike ride.” (SU-K, i-15)</i></p>	<p><i>“I stay out of this [the entrepreneurial community]. I do not feel as if I belong there. And I do not have the feeling that I would get much benefit out of it.” (SO-O, i-19)</i></p>
<p><i>“I think for fundraising it is extremely important that we have our office here downtown. You just coincidentally meet some investors on the street, and they say: ‘Yeah, right, I wanted to get in touch again!’ And they actually do follow up. A lot of things happen by chance. Or you can go to some meet-up in the evening or meet someone for a quick coffee.” (SU-C, i-5)</i></p>	<p style="text-align: center;">Exist entrepreneurs</p> <p><i>“All this hip start-up bla bla, this is not for me. From the very beginning on, I could not identify with that. This is why I was also never interested in having an office space in Prenzlauer Berg [in the heart of the start-up scene]. Me and my co-founders were really happy out here [Berlin suburbs]. You easily get a parking space. That was more important for us.” (EX-1, i-32)</i></p>

Table 2: Practices for resourcing entrepreneurial knowledge and financial capital

	Entrepreneur	Resourced entrepreneurial knowledge...						Resourced financial capital from ...					
		from informal exchange		from		by learning in		private investors		public and semi-public actors		strategic investors	via personal network/EC
		within the EC	with a few other entrepreneurs	mentors	coaches	accelerators	incubators	angel investors	VCs	Exist (or equivalent)	others		
Start-up entrepreneurs	SU-L	✓		✓					✓				✓
	SU-G	✓							✓				✓
	SU-F	✓		✓					✓				✓
	SU-E	✓		(had one)					✓				✓
	SU-J			✓				✓	○				✓
	SU-M	✓		✓				✓	✓				✓
	SU-C	✓		✓				✓	○				✓
	SU-H	✓		✓				✓					✓
	SU-A	✓		✓				✓	○				✓
	SU-I	✓		✓		✓		✓					✓
	SU-D	✓						○					
	SU-B	✓		✓		✓	○	○					
SU-K	✓		✓	○	✓	○	✓	○	✓			✓	
Exist	EX-3	✓			✓				✓	✓	✓		✓
	EX-1		✓		✓		○	○	✓	✓			
	EX-2		✓						✓				
University spin-off entrepreneurs	SO-P			✓	✓		○	✓	✓	✓	✓		✓
	SO-R		✓		✓				✓				
	SO-U				✓				✓	✓			
	SO-Z		✓		✓				✓	✓			
	SO-Y		✓				✓		✓	○			
	SO-V		✓				○		✓	○			
	SO-S		✓						✓	○			
	SO-T		✓		✓				✓	○			
	SO-N		✓		✓				✓				
	SO-W				✓		✓		✓		✓	✓	
	SO-X		✓	✓	✓				✓	✓	✓	✓	
	SO-Q		✓				✓		✓		✓	✓	
	SO-O		✓		✓				✓		✓	✓	

✓ - entrepreneur engaged in this practice | ○ – entrepreneur mentioned this practice, but only rarely engages in it | EC – entrepreneurial community